FLIGHT

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"THE SPIRIT OF FLIGHT," BY SIGNOR LEOPOLD BRACONY.—*Aircraft*, U.S.A.

EDITORIAL COMMENT.

Flying at School.

It is almost impossible to over-estimate the value of the scheme set forth by Mr. L. Blin Desbleds in connection with the Regent Street Polytechnic curriculum of aeronautical engineering. For the past two seasons theoretical classes in the subject have been held, and much valuable work has been done in the training of the young idea. But although it is extremely valuable and necessary, a complete knowledge of the theory of the thing does not take the aspirant for flying honours all the way he desires to go. An equal knowledge of the practical part of the science is even more necessary to success, and it is this practical knowledge which Mr. Desbleds has set out to instil into his pupils. To that end it is proposed to construct a machine, designed and built by the pupils themselves, and fitted with a motor constructed in the Polytechnic workshops, which will be flown by its builders at the institute's ground at Parson's Green. Such is the bald outline of the idea, which, to our way of thinking, is a very excellent one.

In all new sciences and in all new industries the pioneer work is expensive to the individual who is engaged on development work, and the rule applies to the full in the case of aviation. Whatever it may become in the future, flying is certainly not the game of the relatively poor man, and it is not difficult to see how, for lack of means to carry on experimental work, the genius may be prevented from giving to the world the full fruit of his discoveries. A theory which may be of the very greatest importance may be lost in practice simply because its inventor has not the wherewithal to demonstrate it, and who can say what flying has lost in this way? It is because it helps in no small measure to overcome this difficulty that we welcome the departure of the Polytechnic in branching out into practical work of the sort we have outlined. It will give the keen student the opportunity which has hitherto been denied him of putting his theories into practice under skilled observation, and will assist him to discover and overcome mistakes and difficulties which might easily prove insuperable were he left to his own resources. Moreover, it will provide us with that nucleus of trained aeronautical mechanics who have entered the industry from sheer keenness which the infant science requires. We shall follow the working of the enterprise with the deepest interest, in the meantime wishing it all the success it deserves.

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French Aerial Manœuvres.

When the next great war breaks out, our neighbours across the Channel will reap the reward of their enterprise and far-sightedness, while we—but of what avail is it to beat the winds? Day after day we read of fresh demonstrations of the usefulness of the aeroplane as a military instrument, and it is always in France that these demonstrations are carried out. Perhaps it is not altogether fair to give all the credit to the military authorities of that country, for now and again it happens that information leaks out to throw a little light upon the doings of the German or Austrian Army air-forces, but never by any chance do we hear of anything doing in England, except that occasionally we see it reported that one of our officers has made an ordinary cross-country flight—at his own expense, and on his own machine, of course.

At Verdun, the other day, four army officers were sent over the fortress of Toul with instructions to observe how far the new fortifications had progressed towards completion, and to take photographs of them by means of a special apparatus designed by Captain Lebeau, which will enable an observer in an aeroplane travelling at 60 miles an hour at an altitude of 4,000 ft. to secure photographs showing details quite invisible to the eye On their return, the information secured was compared with that furnished by the commander at Toul, detailing the advance made in the construction of the fortress, and of the disposition of his troops when the observers passed over, and the two tallied literally to the uttermost detail. What this would mean to a General in the field is apparent at a glance to the veriest tyro in military matters. It simply means this, that Wellington's famous dictum that victory belongs to the commander who makes the nearest guess to what is happening on the other side of the hill has ceased to be of value. It is no longer necessary to guess at what is taking place—it can be seen and reported with deadly accuracy by the aerial scouts of either side—provided each has been equally far-seeing, and has taken measures to efficiently train its aerial observers during peace. If only the one has taken this wise measure, then it will start with a tremendous handicap in its favour. The only fitting analogy to the condition set up would be that of a blind man groping in the daylight for the seeing antagonist who can follow his every movement.

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Gun *v.* Aeroplane.

The recognition of the immense value of the aeroplane to an army in war has led artillerists all over the world to the study of means for dealing with the destroyer of the air. Even now it is becoming a recognised principle of war that the equipment of troops in the field must include guns which are capable of hitting an aeroplane on the move with the same certainty that the anti-torpedo boat armament of the battleship can deal with the attack of boats when the element of surprise is absent. Experiments have been made recently at the United States naval trial ground at Indian Head, with a one-pounder gun designed to destroy aeroplanes, which, it is said, were perfectly satisfactory. Fifty rounds were fired at a maximum range of 18,000 ft., and at an angle of 85 degrees of elevation. It was found that at altitudes up to 10,000 ft. the shooting was quite accurate, but above that there was a distinct falling-off in accuracy. The report of the tests concludes with the significant remark that it now only remains to perfect the sighting apparatus. It is not that there is any want of accuracy in guns and their sights in these days. Indeed it may be said that under any set of known conditions gunnery has become an exact science. It is no trouble at all to score hits within the effective range of modern guns where the range is accurately known and the speed of the moving target can be properly gauged. But in the case of the aeroplane both of these essential factors must be the subject of guesswork until some genius evolves a range-finding instrument which will give the necessary information instantaneously. Accuracy of gunfire needs no demonstration nowadays—it is too deadly accurate to make it any pleasure for the living target, but its accuracy depends as much on the man at the range-finder as on the man behind the gun. As things are at present it is odds on the aeroplane. How long optical science will be in reversing the odds is another matter.

FLIGHT

THE NEW SHORT BIPLANE.

To design and construct a new biplane fitted with a 100-h.p. plant consisting of two engines and three propellers, is sufficient proof, if any were needed, that Messrs. Short Brothers do not lack enterprise. Moreover, it is evidence that they have the courage of their convictions, for the machine is a full scale experiment intended to test some of their more recent patents. So far as the framework and planes are concerned, the machine adheres more or less closely to the standard practice of the firm, and thus they are following the very proper course of trying out new things on a basic design that they already know something about.

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THE NEW SHORT DOUBLE-ENGINED BIPLANE.—General view from the front, showing the two tractor-screws at the ends of the main planes, and the single propeller in the centre behind.

The new feature is the power plant, which consists of two engines placed fore and aft. The forward engine drives two tractor-screws by means of chains, the after engine is direct coupled to a propeller. The combined power of the equipment is 100-h.p., and both engines are intended to be in operation simultaneously. However, the machine is so designed that either one of its engines will be sufficient to keep the machine flying at a speed of about 36 miles an hour, while with both in operation the speed is expected to be somewhere in the neighbourhood of 55 miles an hour. By so equipping the machine with two entirely independent power plants, the risk attending engine failure is almost entirely obviated, for should one peter out, the pilot will be able to proceed unconcernedly by the aid of the other, and leisurely choose a suitable landing place, where he may descend to make any adjustments to his temporarily disabled engine. This is one advantage that the makers claim for the system. Another is, naturally, the enhanced efficiency of the slow-speed tractor-screws driven by the forward motor, but the third claim is the most interesting of all. Messrs. Short Bros. consider that the draught from these tractor screws will be sufficient to establish a permanent uniform "wind" through the gap of sufficient magnitude to blow out any ordinary gust, and that to this extent they will render the machine far more stable in windy weather than would otherwise be the case. Also, it is anticipated that the efficiency of the planes will be enhanced by working in the propeller draught, which will at all times augment the effective flight speed, and an even more important consideration is that the balancers, which are directly in its wake, will be rendered far more sensitive at slow velocities. It has always been argued in connection with the control of aeroplanes by organs like balancers, which themselves derive their force by flying through the air, that their effectiveness varies with the speed of the machine, and is a minimum when the disturbance is likely to be most dangerous. On the new Short biplane, however, these balancers, by operating in the draught of the tractor screws, will have a minimum useful value that is independent of the speed of flight.

Although these are not all the points that Messrs. Short Bros. are seeking to investigate in their new biplane, they must suffice for the moment, and they are, in any case, sufficient to give weight to our statement that the machine in question is one of exceptional interest and does the makers credit. If we turn from the principles to the machine itself, there is one point on which we feel compelled to make an early remark, which is that the structural work has been finished with all the care that one expects on an aeroplane built to order, and but too seldom finds on one that is built for trial purpose. only. It is, however, characteristic of the firm that their experimental work should be of this description, so we need say no more about its

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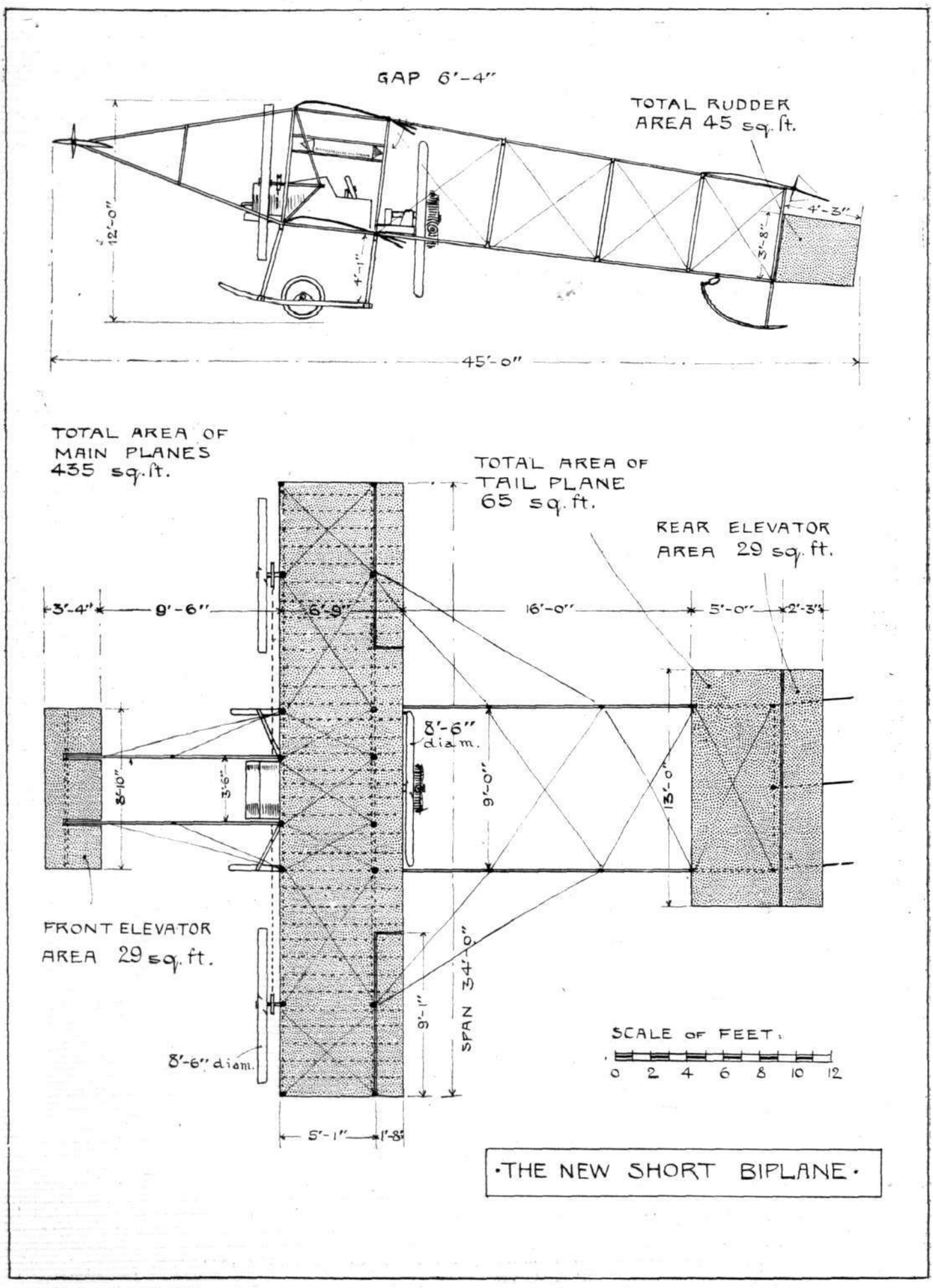
General view from behind of the new Short double-engined biplane, showing the triple rudder. In this the position of the rear propeller and Gnome engine are seen.

Most of what it is necessary to know about the design and construction of the machine can be seen at a glance by the aid of the accompanying photographs and drawings, and much of the detail that is invisible can be taken for granted by assuming that it is the



·THE NEW SHORT BIPLANE·

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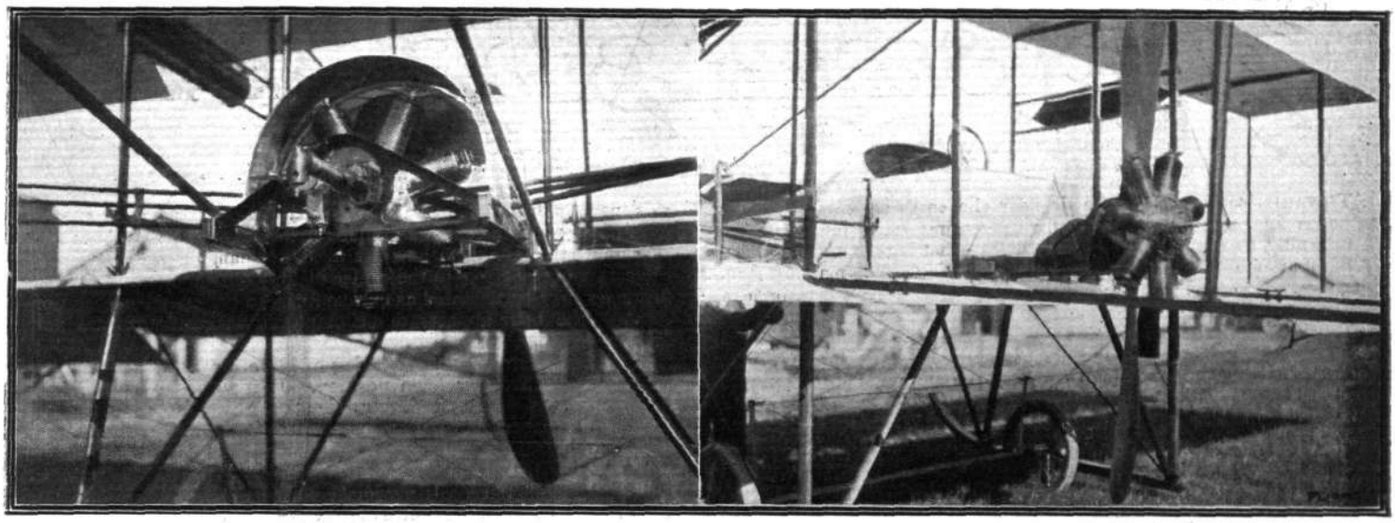
THE NEW SHORT DOUBLE-ENGINED BIPLANE.—Plan and elevation to scale.



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THE NEW SHORT DOUBLE-ENGINED BIPLANE.—On the left the front engine, and on the right the rear engine, propeller, pilot's seat, &c.

same as that already described by us in connection with the standard Short models. Two differences that may be noted, however, are the triple rudder and the small span of the elevator outrigger booms, compared with the span of the elevator itself.

Both engines are seven-cylinder rotary Gnomes, and that in front forms as it were the nose of a car, fashioned somewhat, as it appears at first glance, like the outline of a racing automobile. The pilot sits in this car, and there is room for a passenger alongside him, but although the extra seat is not there yet, we have visions of accommodation being provided for two other passengers behind the pilot if the machine proves anything like as successful as is hoped. The aft motor is situated well behind the back of the car, as one of the photographs shows.

The tractor screws are driven by very long chains, running in tubular guides, and rotate in opposite directions, one of these chains being crossed in order to give the necessary reversal of motion. Wright practice is recalled in the use of these steel guide tubes, and in the shape of the tractors themselves; it affords, in fact, a particularly interesting comparison to note the difference in form between the slow-speed propellers in front and the high-speed propeller behind.

In front of the pilot is a wheel mounted on the top of a pivoted column. Turning the wheel operates the balancers, and a to-and-fro motion of the column controls the elevator. Steering is effected by a pivoted cross-bar under the feet, and this mechanism is fitted in duplicate so that the passenger may work in unison with the pilot.

A point that is worth noting is that the fuel tanks are situated as far away from the engines as is practicable, in order to remove as far as possible the liability of serious accident in the event of an *atterrissage brusque*. They are also fitted with feed pipes of such design as to ensure a constant supply to the carburettor for any attitude that the machine may assume in flight.

So much is, for the moment, all we need say of the new Short biplane, but the fact that it is an experimental machine affords us the opportunity for remarking that it is by no means indicative in itself of the extent of Short Bros.' experimental work, and we should like to congratulate them on this occasion for the thoroughness with which they investigate stresses and strains, and by every means do their utmost to protect the pilot against mechanical failure in flight, for which they very properly say "there is no excuse."

The testing machines at Short's factory at Eastchurch. On the right Mr. Horace Short is testing a 6-ft. strut under compression. The machine on the left is for testing the strength of wires and for determining up to what tension it is safe to trust strainer-eyes.

A Study of Bird Flight

By Dr. E.H.Hankin. M.A. DSc.

TOWARDS sunset, when the air near the earth appears to lose its power of permitting soaring flight, soaring birds may be seen returning to roost by flap-gliding flight—that is to say, by flapping flight alternating with periods of gliding. Each glide may last from 5 secs. to 20 secs.; the periods of flapping may be 5 secs. or less. During the glide the bird appears to travel horizontally. Sometimes there is a slight loss of height at the commencement of the glide and a slight gain of height at the end of the glide—that is to say, there are no grounds for assuming that speed is maintained at the expense of height. On the other hand, it is probable that height is maintained at the expense of speed. In other words, it is probable that during the glide speed is being lost, and that the angle of incidence of the wings is being gradually increased by increase of the dihedral angle of the wings. In the case of cheels, the wings are flat or slightly dihedrally down, but towards the end of the glide the wings may be seen to be dihedrally up. This change of disposition may be seen to be accompanied by a slight gain of height; immediately after this gain of height flapping recommences. In the case of vultures, the wings may be either flat or dihedrally up. The flat disposition seems to be adopted in unsoarable air, and if the bird is about to settle. It may rarely be seen also under conditions that may be regarded as preparatory for flex-gliding. The dihedrally up position appears to be adopted by vultures more often in soarable air and when the bird is about to circle. In the case of flying foxes (*Pteropus medius*, a bat of 44-in. to 51-in. span), which occasionally may be seen in gliding flight for short distances, if the wings are held dihedrally down there is loss of height and increase of speed. For gliding horizontally, or nearly so, this species of bat keeps its wings "arched"—that is to say, concave from side to side.

I have left till now consideration of an important directive movement to which I propose to give the name of the "double dip." This is the easiest movement to observe. It is frequently seen during flex-gliding and at the commencement of a flex-glide.

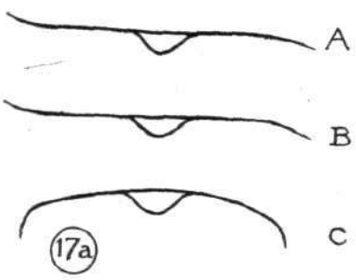

Fig. 17a.—End on view of bird. (*a*) During half-dip; (*b*) During full-dip; (*c*) During double-dip.

In the "double dip" both wing tips (Fig. 17a) are dipped downwards to an equal amount and the wings are during the movement nearly always placed in the dihedrally down position. The result of the "double dip" is that the bird rotates slightly round its transverse axis. It therefore makes a dive downwards. This dive is at once checked as the wings return to their original position. The result of this short dive is that the bird increases its speed, and if it is flex-gliding in soarable air this increase of speed is maintained. I have only been able to observe this rotation on three or four occasions. The following are examples:—

February 13th, 1910.—At 12.36.—A black vulture was seen end on when it was beginning a flex-glide in my direction. The double dip was seen to be accompanied by and apparently to cause a tilting of the body, so that, during the dip, it pointed downwards at an angle of about 45°. This momentary dive seemed to be the initial cause of the increase of speed, which speed was maintained as the bird regained its horizontal position.

March 30th, 1910.—At 4.20.—A brown vulture starting a flex-glide was seen to incline its body downwards during the double dip.

In Fig. 18 is shown diagrammatically the outline of a bird during the double dip. The inertia of the bird may be considered to act through the centre of gravity, at A. The resistance of the wings may be considered to act through the point, B. There must obviously be a couple between these two forces tending to rotate the bird downwards, as shown by the arrow, C.

In Fig. 19 I have shown the position of the wings when in the dihedrally up position. In this case the inertia acts at A, and the resistance of the wings at B, resulting in a couple that tends to rotate the bird upwards, as shown by the arrow, C.

We have now considered two cases of rotation round the transverse axis, namely, rotation upwards, as used for checking a dive, and rotation downwards, as in a double dip. In both these cases rotation round the transverse axis is caused by changing the relation of the centre of resistance to the centre of gravity of the body. These instances may be regarded as extreme cases. The same method of rotating the body appears to be employed in cases that are not extreme.

As already stated, a cheel wishing to glide downwards places its wings in the dihedrally down position. If it wishes to increase the steepness of its descent it elevates the tail, which is closely furled. If the tail feathers have been cut off, the posterior portion of the body can be seen to be elevated—that is to say, there is no reason for believing that the elevation of the tail acts by any effect of air currents on its surface. It obviously must act by further increasing the distance between the centre of gravity and the centre of resistance of the wings. I have also seen elevation of the tail for gliding downwards in vultures and other species of birds.

Cheels when ease-gliding not infrequently show up and down movements of the furled tail. The range of movement of the end of the tail may be an inch or more. This tail jolting is seen especially in irregular winds and when the bird is travelling comparatively slowly. It is never seen in fast flex-gliding. Occasionally in irregular winds each upward jolt of the tail is accompanied by

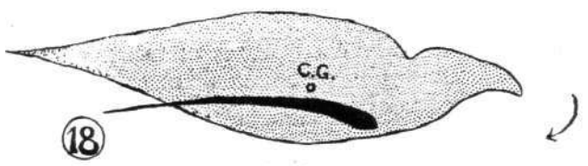

Fig 18.—Outline of a bird during double dip.

increase of the flexing of the wings, that is to say by an adjustment that is associated with increase of speed. I have seen slow up and down movements of the tail in the case of the Lammergeyer when gliding at low rate. On one occasion I saw a sudden tail jolt in the case of a black vulture. This movement was associated with the wings being placed momentarily in the dihedrally down position.

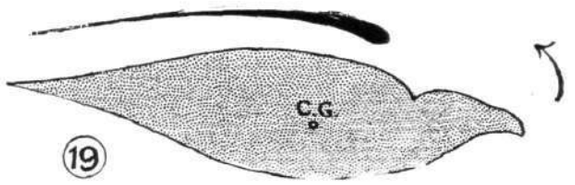

Fig. 19.—Outline of a bird with wings dihedrally up.

In the case of "tailless cheels" energetic jolting movements of the hinder end of the body occur especially in an irregular wind. It is not likely that these movements are purposeless. The facts brought forward in this chapter suggest that they have to do with maintenance of equilibrium round the transverse axis.

Thus it appears that birds can alter the distance between their centre of gravity and their centre of resistance. They do this by changes in the disposition of the tail and hinder part of the body and by changing the dihedral angle of the wings. In a later chapter I shall have to describe another method of producing rotation round the transverse axis.

CHAPTER X.—Can Soaring take place in a Dead Calm?

If it is admitted that soaring occurs when the air at the ground level is calm or nearly calm, what proof is there that wind is equally absent at the height at which birds are circling?

In the case of cheels this height may be only three or four metres above the roof of my house. In the case of vultures the height is slightly greater. If it is calm on the roof of my house the air is not likely to have much velocity at so small a height above it.

Small whirlwinds or dust devils frequently occur in Agra on warm days when the air is nearly calm. A dust devil consists of a column

of dust in rapid rotation. It may be three or four metres in diameter and may reach a height of several hundred metres. At its upper extremity the column of dust expands, forming a light yellowish cloud which persists for some time after the column of dust from which it arose has vanished. The air in the immediate neighbourhood of a dust devil appears to be rising, for I have seen a piece of paper carried up in a slanting direction, in the neighbourhood of a dust devil, to a great height, possibly 800 metres, before it went out of sight when followed with a binocular.

Soaring birds seem to take no notice of these dust devils, as a rule. On one occasion (December 11th, 1910) I saw a group of cheels apparently within the sphere of influence of a dust devil. Five cheels were ease-gliding at a height of about 80 metres and at about 100 metres distance. A dust devil passed slowly by about 200 metres away from the birds. The cheels gradually ascended to a height of about 200 metres. Then they flex-glided away in different directions. The ascent of these cheels was not due to circling, that is to say to ordinary soaring flight, because firstly there was no leeward drift, secondly they rose as a group keeping more or less their relative distances, and there were no stragglers. Hence it is probable that they were lifted by a rising current of air connected with the dust devil.

On several occasions during October, November and December of 1909 (but not during the same months of 1910) I saw pieces of jawar leaf or pieces of grass floating in the air. There can be no doubt that they had been carried up by dust devils and that when I saw them they were falling. In all cases their horizontal movement was very slow, indicating that at the height at which they were observed the wind was as light, or nearly as light as it was near the earth. Knowing the probable size of these pieces of leaf, it was possible to make a rough estimate of their height which on some occasions may have been as much as 200 metres above ground level.

On the 8th February, 1910, I saw a boy's kite floating in the air at a height far above that at which it is likely to have been flown. As these native kites are nearly always of the same size, I was able to make an estimate of its distance. It was at about 1,000 metres distance. It was probably 500 metres above the earth. It was only visible to the naked eye when the sunlight fell on its white surface. The wind was so light that its direction of fall made an angle of 10° to 20° with the vertical. It was watched till it went out of sight behind some trees. Several birds were circling and flex-gliding near. It may be explained that these native kites are so light that they can be flown in a wind that is scarcely perceptible.

I have nearly a dozen entries in my diary of pieces of paper or feathers being seen floating in the air. On one occasion a feather was seen in the midst of a cluster of circling cheels, and its motion was noted as being imperceptible. Once a feather was seen to drop off a cheel, and showed by its almost complete lack of movement the small amount of movement in the air. During October and November at Jharna Nullah, when one or two thousand birds may be circling and gliding together, it is rarely necessary to wait for more than a few minntes to leeward of the clusters of birds to see one or more feathers floating in the air.

In the calm weather that often occurs in October and November after the close of the monsoon season, smoke from factory chimneys can be seen rising vertically to an immense height. I have seen this smoke reach a height that I estimated at being nine times the height of the chimney. The chimney is 135 feet high, hence its smoke must have reached a height of 430 metres. Vultures in the neighbourhood were circling at lower levels.

On a calm morning during the cold weather a light mist, composed, I believe, of smoke and dust, commonly lies over the city and country. It is not very thick. Usually a factory chimney is visible through it three miles away. The smoke from this chimney can be seen dimly rising through the mist, and spreading out in all directions horizontally, forming a layer like a thin cloud. As the sun gathers power the smoke may be seen piercing this layer, and rising vertically. To all appearances the air is completely calm. It is very striking to see the cheels rise circling in and through this mist. Their time of starting is not in the least delayed by the complete absence of wind.

The appearance of rest in the air is, however, deceptive. Rising eddies of air formed under the influence of the sun's rays are already beginning. These "heat eddies," as I propose to call them, can best be seen through a binocular held firmly in a clamp. As the heat eddies develop the edges of the flat roofs of buildings may be seen to acquire an appearance of shimmering and quaking. The eddies resemble waves far more mobile and active than the waves of an angry sea. The slightest wind causes these eddies to appear to run along the lines of the buildings. Observation of these eddies can be used as a test to see whether or not wind exists. It is a test far more delicate than the sense of touch, and even perhaps than observing the movement of smoke. On two occasions during the cold weather of 1910-11 I have seen complete absence of wind as tested by heat eddies, and on each occasion the circling of cheels began at its normal time.

In view of the above facts, there can be no doubt that it is inaccurate to describe the soaring bird as getting its energy from the wind. In other words, in attempting to discover the source of the energy of soaring, the movement of tangible masses of air that we know as wind must be left out of account.

CHAPTER XI.—Description of circling of Cranes.

A remarkable and important characteristic of circling flight, namely, its regularity, can only be seen and appreciated with difficulty in the case of vultures, but can be readily observed in the case of cranes. I was once watching between 50 and 100 cranes starting from the river bed beyond the Taj. They were flap-gliding in large circles until they reached a height of between 100 and 200 metres. They then circled without flapping. Their leeward drift indicated that the wind was north-west. As I had been under the impression that the wind was west (it was very light at the time), I at once sent a boy to fly a kite, and found thereby that the wind was N.W. as had been indicated by the drift of the circling cranes.

In the case of vultures the point round which they circle is situated somewhere near the centre of the cluster of birds. In the case of cranes this central point is not inside the cluster but outside it, at a distance of perhaps 200 metres or more from the group of birds.

The birds form a compact group as they glide round this central point. The remarkable feature of their flight is the regularity and exactness with which they keep their distance from one another. If anyone was shown such a group of cranes through a binocular without being told what he was looking at he might easily believe that he was looking at a number of dead birds pinned on to a wall, all pinned on with their wings in exactly the same position. While the cranes were on the up-wind side of their track they looked black in colour against the background of pale blue sky. As they neared the windward side and gradually turned, they appeared to diminish in size till suddenly they were visible in end on view, each bird then looking like a black inclined line with a central dot representing the body. The change from the side view to the end on view appeared to take place within one or two seconds for the whole group. As the birds turned from the windward side to the down-wind side of their track, the change was equally sudden. Within one or two seconds, as it seemed to me, every bird had changed in appearance, and now showed the upper surfaces of their wings, which appeared nearly white in colour from the reflected sunlight. Towards the end of the down-wind glide perhaps one or two birds showed occasionally some slight deflection (not beating) of their wings. Then came the sudden change to end on view that the birds presented along the leeward side of their track. While thus circling the cranes were rapidly gaining height, in a quarter of an hour reaching a height of about 1,200 metres. They then reversed the direction of their circling once or twice, still keeping in a compact group. They then flex-glided away in a northerly direction. In so doing they arranged themselves side by side in a long line dented in the middle, like a letter V, but with an obtuse angle, and with the apex forward. The birds were at regular distances, and kept their distances with almost the same marvellous regularity as they did when circling. Their flex-gliding was canted. Every bird was canted to the same degree, and remained so till they were out of sight. (Date of observation, 28th March, 1910, at 4.15.)

This regularity of the gliding flight of cranes when circling or flex-gliding has a certain theoretical interest.

It has already been shown that the soaring bird does not get its energy from the wind. Therefore, it must get its energy from the air. Unless the bird actually changes the air by its passage, it is impossible for it to get energy from the air if the air is homogeneous. Therefore soarable air must be heterogeneous. Because cranes when soaring do so with regularity, therefore they must get their energy from the air at a constant rate. Therefore the heterogeneity of the air must be fine grained. This conclusion may be expressed more clearly in another way. My friend, Dr. Morris Travers, of the Indian Institute of Research, suggested to me that possibly soaring birds might get energy by meeting eddies and extinguishing their motion. The suggestion appears to me of interest, as the first formal theory of the nature of soarability that I have heard of that has any regard to the facts of the case. Supposing it is true, then since the bird gets energy by meeting eddies at a regular rate, such eddies must be small in comparison with the size of the bird, and must be uniformly distributed. It is likely that after bringing forward further evidence, I may bring forward another theory of the nature of soarability.

In view of the results already described, it is certain that soaring flight cannot be due to the bird taking advantage of chance currents of wind. Something of a more uniform and regular character must be looked for in soarable air. So far as the present evidence goes, it is logical to investigate any movements of the nature of eddies in soarable air, even if they are of microscopic or ultra-microscopic size.

(To be continued.)

FLIGHT AT THE BRITISH ASSOCIATION.

FOR the second year in succession the British Association, now in session at Portsmouth, has provided a platform for the discussion of problems relating to flight, and on this occasion an invitation was extended to our Technical Editor to open the same on behalf of the Mechanical Science section, which held a joint meeting with the Mathematical and Physical section for the purpose of more adequately treating both aspects of the subject.

In his opening remarks Mr. Berriman adopted the view that the purpose of the British Association, which is the advancement of science, falls short of complete fulfilment unless it takes heed of the multitude at the foot of the ladder equally with the few, who, having arrived at the top, seek to make a new rung. The President of the Association struck the key-note to which this particular session should be tuned in saying "pay regard to the future," and, as Mr. Berriman contends, one of the more obvious probabilities associated with the time to come is that vastly more people than at present will need a scientific training in order to retain their inherited station in life. Understanding is born of interest, and, so far as science is concerned, there is no department of it that interests the lay public as flight does to-day, wherefore, as Mr. Berriman suggested, the British Association could scarcely find a subject better fitted to the fulfilment of this aspect of its general purpose.

For these reasons also, Mr. Berriman asked that the scientists present should address themselves to students rather than to engineers, and selecting the efficiency of an aeroplane as the main theme of his argument, he proceeded to devote the remainder of the thirty minutes available to a summary of some of the missing links in our limited chain of knowledge. Pointing out that the efficiency of a flying machine determined, quite apart from considerations of safety, the possibility or otherwise of making exceptional journeys, such as flying across the Atlantic, for example, he presented the elementary analysis of the problem with which readers of FLIGHT are already familiar.

The main heads of this argument represent efficiency as the relationship between thrust and load, show load to be a function of the dimensions of the plane and the thrust required, which is equal to the resistance to be overcome, to be the sum of three separate parts, one of which is represented by the energy lost in the air disturbed by the plane in flight, while the other two represent the energy caused by the air friction on the surface of the planes, and on the surface of the body of the machine. In each of these subsections there are various points on which differences of opinion exist—and among the questions that Mr. Berriman asked his audience to discuss were—

What is the effective angle of a cambered plane, assuming that some angle or other is a necessary factor in any mathematical expression for the lifting power of the plane in flight?

What are the effective dimensions of the mass of air disturbed by a plane in flight, assuming that it is necessary to know this mass in order to estimate the lift?

What is the coefficient of skin friction in air? A flat plate facing the wind has a coefficient of resistance ($\cdot 003V^2$) that has been established by many authorities, and is accepted by practical engineers, but when the flat plate is put edge on to the wind, we have no corresponding authenticated coefficient that will enable the designer to estimate the resistance of a stream line form.

These were among the more important definite issues put before the meeting, but those who took part in the discussion preferred to open further debatable ground, and little that was of any purpose was accomplished in the hour and three-quarters allotted to the business of the meeting.

Dr. Shaw, taking the meteorologists' point of view, explained that the atmosphere was never at rest or in a uniform state of motion, and that wind changed in velocity and direction with exceeding suddenness. To these facts he attributed the phenomenon of "air holes," and considered that higher speeds offered the most direct solution to the problem of safety, seeing that the effect of a gust would be smaller in proportion to the higher velocity of the machine. Professor Petavel, who has just returned from a month's flying on Salisbury Plain, was of the opinion that higher speeds would involve the necessity of being able to vary the effective speed of the machine in order to overcome the difficulty of ascent and descent, but Mr. W. H. Dines pointed out that gustiness decreased with altitude, consequently if there was any safety at all in high speed it was far more necessary to fly fast near the earth than at a great height.

These generalities are, of course, fairly well known—at any rate to students of aeronautics—and they merely bring one back to the main issue, which is how to increase the efficiency of the machine so that it may be possible to fly faster without employing more and more powerful engines. Also, of course, the subject of variable speed is intimately related to efficiency, and this again shows the importance of knowing something more about skin friction and the effective angle of plane.

According to some sections of the daily Press, the principal feature of the discussion was an attack upon the notion of automatic stability. It is a little necessary to qualify this remark by explaining, in the first instance, in what sense the term automatic stability was used. Mr. Berriman only had time to refer quite briefly to the subject at all, and in those few words he confined himself to drawing attention to three different means of maintaining equilibrium in flight. The first came under the heading of human control, the second under the heading of natural stability, and the third was described as automatic stability. There is a distinction between natural and automatic stability that it is very necessary to observe in order to avoid confusion of thought. Natural stability is inherent in the form or design of the machine, and does not depend on the operation of any device. Automatic stability, on the other hand, is the balancing of the machine by means of automatic mechanisms, as for instance the gyroscope, which are supposed to take the place of the pilot in the system of human control. Modern aeroplanes are in some measure naturally stable, and for the rest are controlled by human intelligence; very little progress at all has been made along the lines of automatic stability. Discussing this aspect of the subject, Sir William White, the well-known naval constructor, said he thoroughly distrusted such devices.

The following is a summary of Mr. Berriman's paper:—

THE PRINCIPLES OF FLIGHT.*

One of the greatest services that can be rendered to the science of aeronautics at the present time is to attract towards it the serious interest of minds that have matured in other departments of the world's work. With this object in view an attempt will be made to give a *résumé* of the more interesting problems as they are understood by the majority of students, in the hope that those taking part in the discussion may thereby be enabled to direct their remarks along such lines as shall add most to the sum total of our little knowledge in the short space of time available.

The present predominance of the military aspect in the perspective view of the immediate future of aeronautics serves also to draw a dividing line between different forms of aircraft, such as to group all systems essentially possessed of the ability to ascend vertically and hover stationary in the air on one side, and all those that can neither stand still in the air nor get up from anywhere, on the other.

Balloons and Kites.—Thus, the captive balloon and the man-lifting kite both perform useful work, although neither navigates the air at large. The free moving aeroplane, on the other hand, is frequently criticised because it does not at present possess the potential qualities of the as yet unsuccessful helicopter.

The Helicopter.—It seems necessary to pay some attention to the problem of the helicopter, therefore, in order to see how far an elementary investigation of its principles supports the likelihood of realising the possibilities frequently assumed in its favour.

It has been suggested that some insects fly on the helicopter principle.

It may be demonstrated that the very small helicopter is a remarkably suceessful toy, although the large helicopter is as yet an unsuccessful machine. A mathematical ratio (see the "two-thirds power law" in summary of formulæ) indicates that the application of increased power to a given screw is an inefficient method of increasing the lift. It is suggested that the ratio of essential dead-weight to effective lifting area may also increase so disproportionately in large machines as to prevent the practical success of the helicopter class.

Inasmuch as the largest screw for a given load is the most efficient, it is argued that the aeroplane is the helicopter of maximum efficiency; inasmuch as it represents a blade element flying on the straight line periphery of a circle of infinite diameter.

Dirigibles.—Under the assumed division, dirigibles and aeroplanes have to be compared as alternative machines for fulfilling the same purpose. Both navigate the air, but the dirigible, in addition, can ascend vertically and hover stationary above any given spot. Windy weather adversely affects both types of machines. In the

* The complete work (109 pages) with diagrams and notes has been printed and can be obtained (price 1s.) on application to the Publishers, 44, St. Martin's Lane, London, W.C.

aeroplane the gust is inimical to stability; in the dirigible a high wind exerts an enormous drifting force. Comparatively large sizes are necessary in dirigibles if they are to have a wide range of action. The more important disadvantages of dirigibles result from the permeability of the fabric to hydrogen, the costliness and inconvenience of using this gas, and the disturbing influences of sunshine and shadow on buoyancy.

Aeroplanes.—The aeroplane is the more interesting machine of the two in the eyes of the majority of students, owing to the popularity of flight as a sport. A broad treatment of the problems relating to this section divides them under two heads: one dealing with the lift and resistance of the cambered plane, the other dealing with stability, which has always been the most important factor making for progress in aviation.

Calculating Lift.—In the mathematical section, an hypothesis that aeroplanes are supported in flight by the inertia of the air, leads to the necessity of finding plausible expressions for mass and acceleration.

Two dimensions of the mass of air deflected are plausibly functions of the span and chord of the plane; the third, which defines the depth of the stratum and is known as the "sweep" is taken as an empirical function of the chord, but this connection needs discussion.

Acceleration is obviously a function of the angle of the plane, but difference of opinion exists as to how that angle should be measured. A suggestion is put forward in favour of the "angle of deflection" measured at the point of intersection of tangents drawn to the leading and trailing edges of the plane, which needs discussion.

From the assumed premises a rough and ready formula for lift has been evolved (see summary of formulæ).

Skin Friction.—In order to extend the premises to cover a plausible expression for the resistance to flight and the power expended thereon, it is necessary to adopt a value for skin friction.

Zahm's experiments have been accepted as data (see summary of formulæ), but the whole subject needs discussion. Skin friction is of such fundamental importance in aerodynamics that it is imperative to put it upon an accepted basis analogous to the position occupied by normal pressure.

Coefficient of Flight.—The coefficient of flight, representing the resistance per unit load, may be shown to be independent of speed, but to depend on the angle of the plane and to have a minimum value depending on the coefficient of skin friction. On the present hypothesis, the minimum coefficient of flight obtains with planes of a very small effective angle (about 5°), such as would necessitate flying at much higher speeds than have hitherto been realised.

The existence of an angle of least resistance is very important in connection with the problem of variable speed machines.

Body Resistance.—Body reststance in a practical aeroplane is a supplementary resistance to that of the planes, and should always be considered as such. It stands in the way of realising the higher speeds that would lead to the use of more efficient planes, but by enclosing all the principal masses in casings of streamline form a plausible means is afforded of considerably reducing this quantity.

A comparison of the coefficients of normal pressure and skin friction indicates a very large possible saving in this direction.

In bodies of streamline form the advantages of a hemispherical head are worthy of consideration.

Stability.—Stability in a flying machine is either natural as the result of form, automatic as the result of self-acting mechanisms, or controlled by human intelligence.

No particular progress has been made along the lines of automatic stability, although the use of gyroscopes and wind vanes to operate relay mechanisms has frequently been suggested. Natural stability has, however, been realised to some extent and, coupled with modern expert control, the combined result has reached an extraordinarily high degree of perfection considering the short period of evolution.

Natural stability in its elementary form may be readily demonstrated by means of paper models. In practical aeroplanes, natural stability in the longitudinal vertical plane is mainly based on the principle of the dihedral angle. Natural stability in the lateral vertical plane is also commonly based on the same principle, but alternative systems, one of which is the arched wing, have been tried.

The arched wing and the dihedral being apparently diametrically opposite in principle, attention is drawn to two orders of stability, "stiff" and "rolling." The relative possibilities of successful development along each line is well worthy of discussion.

The ascentric centre of gravity, in which the principal masses are placed well below the centre of pressure, is frequently suggested as a stabilising principle, but the permanent existence of a couple between the centre of gravity and the centre of pressure indicates liability to pronounced oscillation, and the system does not find general favour.

In connection with the under-carriages of aeroplanes, the advantage of landing direct on skids is urged, and in connection with the power plant, the possible disturbing influence of the gyroscopic force of heavy revolving masses is worthy of notice.

Conclusions.—Apart from the question of stability, progress in flying machine design is mainly a problem of increasing the efficiency of the machine, just as it is in every other branch of mechanical engineering. It follows, therefore, that the need for further information on such subjects as the effective angle of a plane, sweep, skin friction, and other similar problems that come within the province of research work in physical science, is all important. If the aeroplane of the future is to carry heavy loads and to fly far and fast without interrupting its journey, it must be more efficient than the aeroplane of to-day. The air, like the ocean, permits of full speed ahead all the time, and a speed of 60 m.p.h. through the air would halve the present fastest crossing of the Atlantic. Before an uninterrupted journey across the 1,700 miles that separate the nearest adjacent points of land could be accomplished by a machine carrying only two men it would have to be shown that an aeroplane could be built capable of carrying at least 1,500 lbs. of useful load at 60 m.p.h., with a gliding angle more nearly in the order of 1 in 7 than the angle of 1 in 4 or 5, which at present represents the efficiency of a good modern flyer.

Except so far as a pilot might be able to economise power, as soaring birds do, by taking advantage of favourable air-currents, skilful control has nothing to do with the theoretical possibilities of the aeroplane in undertakings of this order, which may be investigated by the aid of simple arithmetic. In matters affecting the use of machines in bad weather, for dangerous purposes, and under difficulties generally, nothing in the world gives any clue to the future except the present state of the art, for which the intrepid practice of pilots and the care of those who build machines is wholly responsible and deserving of the utmost credit.

Summary of Formulæ.

The two-thirds power law.—If thrust $\propto V^2$ and power $\propto V^3$, then thrust $\propto$ H.P.$^{\frac{2}{3}}$.

Mathematics of the cambered plane.—

$$\text{Lift} = \frac{V^2 \tan \beta}{200}$$

where V = flight speed m.p.h.
β = angle of deflection.

Skin Friction.—Zahm's formula—

$$R = \cdot 0000316 l^{\cdot 93} V^{1\cdot 85}$$

where R = resistance of double surface lbs./ft. of span,
l = chord,
V = velocity m.p.h.

Approximation (1 to 90 m.p.h. and high aspect ratio)

$$R = \cdot 000018 V^2.$$

Coefficient of Flight.—

$$\text{Lbs. thrust per lb. loading} = \left[\frac{\tan^2\beta + \cdot 0072}{2 \tan \beta}\right].$$

Minimum value obtains when $\beta = 5^\circ$ approx., and gives least coefficient of flight = ·085.

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More French Military Pilots.

AMONG those who have lately qualified for the French Military Superior Certificate may be noted Lieut. Briey, who passed on a Deperdussin; Capt. Bares, who made the three tests within 24 hours on a Maurice Farman biplane; Kuhling, a pilot of the Blériot school; Duflot, Kimmerling, Reymond, and Lieuts. Sourdeau, Van der Vaero and Rolland. The list is mounting up in an incredible way, and leaving the British Army a terrible amount of leeway to make up, thanks to the procrastinating policy of our Government, who are too busy voting themselves and their friends fat sinecures at the expense of the placid taxpayer, to bother about Imperial defence. It might be worth noting, however, that a successful foe does not *necessarily* take over obligations of that character. *Then* perhaps our rulers may wish they had bought aeroplanes, and encouraged the Army to become proficient in their use.

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An Up-to-date Senator.

M. EMILE REYMOND, of the French Senate, is determined to be up-to-date. Not only has he learnt to fly, but he has qualified for the French Military superior *brevet*. He intends to make a flying tour over the Department of the Loire, which he represents in the Senate. His opinion should carry some weight in any Parliamentary discussions on aviation matters.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Committee Meeting.

THE next meeting of the Committee will take place on Tuesday next, September 12th, 1911.

Federation Aeronautique Internationale Conference.

Aviators' Certificates.—The Committee are now considering the advisability of raising the standard of efficiency to be attained by candidates for aviators' certificates, and will be glad to receive any suggestions on the subject. The Royal Aero Club will raise the question at the next meeting of the Federation Aeronautique Internationale, which takes place at Rome in October next.

The Royal Aero Club will also bring forward the protest of C. Grahame-White against the award in connection with the Statue of Liberty Prize.

General Committee.—A meeting of the General Committee of the Royal Aero Club, which includes representatives of the associated clubs, will be held at 166, Piccadilly, London, W., on Tuesday, September 26th, 1911, at 3 o'clock, at which the questions to be brought up at the conference of the Federation Aeronautique Internationale, to be held at Rome in October next, will be considered and delegates appointed.

The following clubs associated with the Royal Aero Club will be represented :—Scottish Aeronautical Society, Aero Club of Ireland, Bristol and West of England Aero Club, East Riding Aero Club, Manchester Aero Club, Northumberland and Durham Aero Club, and Yorkshire Aero Club.

Eastchurch Flying Ground.

The telephone has now been fixed at the Club's flying grounds at Eastchurch, and the number is "9 Minster-on-Sea."

Late Hon. C. S. Rolls and Cecil Grace.

Several residents at Eastchurch have expressed the wish to place a stained glass window in the Church at Eastchurch, in memory of the late Hon. C. S. Rolls and Cecil Grace, both of whom made their first experiments in flying in the district.

The following amounts have so far been contributed :—Collected at Eastchurch, £12 ; Hon. M. Egerton, £5 ; F. K. McClean, £5 ; W. J., 10*s.* ; H. P., 10*s.* ; F. S., 5*s.* ; James W. Grace, £5 ; J. Armstrong Drexel, £1 ; P. R. Grace, £5 ; C. A. Grace, £5 ; Harry Turrill, 10*s.* 6*d.* ; C. R. Grace, £5 ; total, £44 15*s.* 6*d.* Members wishing to contribute are requested to communicate with the secretary of the Royal Aero Club.

British Empire Michelin Cup (No 1).

(Under the rules of the Royal Aero Club and Federation Aeronautique Internationale).

Intending competitors are reminded that the competition for this year closes on October 31st. The rules are as under :—

The Michelin Tyre Co. has presented to the Royal Aero Club of the United Kingdom, for competition by British aviators, a trophy of the total value of £500.

Annually, for five years, a replica of this trophy, together with a sum of £500 in cash, will be given to the successful competitor. This trophy will be competed for under the following conditions, which shall apply for this year only :—

Conditions.—1. The holder of the cup for 1911 will be the competitor who, on October 31st, 1911, shall have accomplished the greatest distance on an aeroplane in flight without touching the ground.

2. The minimum distance to be covered in order to qualify for this prize shall be 250 miles round two or more mark posts for the necessary number of circuits.

3. Entries must be made in writing to the Secretary of the Royal Aero Club, 166, Piccadilly, London, W. At least two clear days' notice must be given by a competitor before making his attempt.

4. The entrance fee of 10*s.* and a further sum of £1 must accompany every notification of an attempt. Competitors, however, may give notice that they will compete from day to day and in such cases must pay a deposit of £10 to cover the necessary fees for attempts on ten consecutive days, which will be returned (less expenses incurred) in respect of those days on which no attempt is made. Every competitor must be a member of some recognised body dealing with aerial matters in the Empire, and must hold an aviator's certificate issued by the International Aeronautical Federation, represented in this country by the Royal Aero Club.

5. All attempts must be made between the hours of sunrise and sunset, in the presence of the official or officials appointed by the Royal Aero Club.

6. The recognised flying grounds of the Royal Aero Club are at the Isle of Sheppey, but the Committee will be willing to entertain any other ground subject to the competitor paying the necessary expenses incurred.

7. The start for the records will be reckoned from the crossing over the starting line in actual flight.

8. Competitors must be British subjects from any part of the Empire, manipulating a British-made aeroplane. All the principal parts of the aeroplane must be British made. All decisions applying to this rule shall be given by the Committee of the Royal Aero Club. This shall not be held to apply to raw material, but all finished or manufactured parts of such aeroplane must comply with the above condition.

9. The decision of the Committee of the Royal Aero Club on all matters connected with this competition to be final and without appeal.

British Empire Michelin Cup (No 2).

(Under the rules of the Royal Aero Club and the Federation Aeronautique Internationale.)

Intending competitors are reminded that the competition for this year closes on October 15th. The rules are as under :—

The Michelin Tyre Company has presented to the Royal Aero Club of the United Kingdom for competition by British aviators, the sum of £1,800 divided into three yearly awards, as follows :—

£400 for the year 1911,
£600 ,, 1912,
£800 ,, 1913,

to which will be added a trophy each year, to be retained by the winner.

The following are the rules governing the competition for the year 1911 :—

1. The winner for the year 1911 shall be the competitor who, on October 15th, 1911, shall have completed a prescribed circuit of about 125 miles on an aeroplane in flight in the fastest time, reckoned in miles per hour.

2. A competitor may make his flight round any one of the following circuits :—

1.	2.	3.	4.
Eastchurch.	Hendon.	Brooklands.	Amesbury.
Brooklands.	Bedford.	Hendon.	Swindon.
Hendon.	Huntingdon.	Leighton Buzzard.	Henley.
Brentwood.	Cambridge.	Aylesbury.	Alton.
Eastchurch.	Hendon.	Oxford.	Amesbury.
		Brooklands.	

A competitor may start from any point named in the circuit, provided always that the complete circuit is accomplished without alighting.

3. The flight must be observed at each point named in the circuit by officials appointed by the Royal Aero Club.

4. A number must be prominently displayed on the aeroplane in places approved by the officials, and when flying round each of the points selected in the circuit, the aviator must fly sufficiently low so that his number may be easily verified by the official observer.

5. The circuit must be completed between the hours of sunrise and sunset, on any one day.

6. The entrant, who must be the person operating the machine, must be a British subject flying on a British-made aeroplane, must hold an Aviator's Certificate, and must be duly entered on the Competitors' Register of the Royal Aero Club.

7. The complete machine, and all its parts, must have been entirely constructed within the confines of the British Empire, but this provision shall not be held to apply to raw material.

8. An entrance fee of £1 must accompany every notification of an attempt, and at least three clear days' notice must be given to the Secretary, Royal Aero Club, 166, Piccadilly, London, W.

A competitor must further deposit a sum of £10 on account of expenses, if any, of observers. Any balance not so expended will be returned to the competitor.

9. Should any questions arise at any time after the date of entry as to whether a competitor has properly fulfilled the above conditions, or should any other question arise in relation to them, the decision of the Committee of the Royal Aero Club shall be final and without appeal.

10. A competitor by entering waives any right of action against the Royal Aero Club or the Michelin Tyre Co. for any damages sustained by him in consequence of any act or omission on the part of the officials of the Royal Aero Club or the Michelin Tyre Co., or their representatives or servants, or any fellow competitor.

11. The aeroplane shall at all times be at the risk in all respects of the competitor, who shall be deemed by entry to agree to waive all claim for injury either to himself or his aeroplane, or his employees or workmen, and to assume all liability for damage to third parties or their property, and to indemnify the Royal Aero Club and the Michelin Tyre Co. in respect thereof.

12. The Committee of the Royal Aero Club reserves itself the right to add to, amend or omit, any of these rules should it think fit.

HAROLD E. PERRIN,
166, Piccadilly. Secretary.

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PROGRESS OF FLIGHT ABOUT THE COUNTRY.

NOTE—Addresses, temporary or permanent, follow in each case the names of the clubs, where communications of our readers can be addressed direct to the Secretary. We would ask Club Secretaries in future to see that the notes regarding their Clubs reach the Editor of FLIGHT, 44, St. Martin's Lane, London, W.C., by first post Tuesday at latest.

Aero Models Association (NORTH METROPOLITAN BRANCH).

THERE will be two open competitions for models on September 30th, at 3 p.m., at the club's flying ground in Bishop's Avenue, East Finchley, N. A rising from ground competition, combined with distance, will be held, in addition to a competition in which models will have to be flown to a pole 200 yards from the starting line. The winning model in this competition will be the one to land nearest the said pole. In each competition a 1st prize of 10*s.* 6*d.* is offered by the Earl of Ronaldshay and other prizes will be offered at the discretion of the committee should the number of entries warrant it. Full particulars and entry forms can be had from the Secretary of the Aero Models Association at Caxton House, Westminster, S.W., and the last day for sending in entries to the Hon. Secretary to the Northern Branch, Malcolm B. Ross, 13, Highgate Avenue, Highgate, N., is Friday, September 29th.

Model Aeroplane Competition at Bath.

A WELL-ATTENDED Model Aeroplane Competition took place on Saturday afternoon in a field in Englishcombe Lane, lent by Mr. T. C. Gifford, of Westfield Farm, Bloomfield Road.

An attractive list of classes had been arranged, the winners of which were as follows:—

Best Workmanship of Flying Model.—1, S. W. Weston; 2, A. E. Pearse (of the Pearse Aeroplane Co., Bristol); 3, R. Cross.

Most Stable Model.—1, R. Cross; 2, Mr. Smawcombe (of Bristol).

Highest Flight.—1, A. E. Pearse; 2, J. E. Grivell; 3, S. H. Baker.

Greatest Distance Flown.—1, Mr. Smawcombe (460 ft.); 2, A. E. Pearse (168 ft.); 3, S. H. Baker (141 ft.).

Fastest Speed for 50 yds.—1, Mr. Smawcombe (7 secs.); 2, R. Cross (11⅘ secs.); 3, S. H. Baker (40 yds. in 6½ secs.).

Duration.—1, R. Cross (22⅘ secs.); 2, Mr. Smawcombe (16⅘ secs.).

Best Circular Flight.—1, R. Cross; 2, Mr. Smawcombe.

Best Glide.—1, R. Cross; 2, Mr. Smawcombe.

Mr. Wm. Palmer rendered kind services as judge, assisted by Mr. T. T. Hale. Major L. M. Boileau, who had expressed his approval of the scheme, was unfortunately prevented from attending in consequence of another engagement. It is hoped to arrange for similar competitions to take place at frequent intervals, and the Hon. Secretary, Mr. S. H. Baker, of 11, Elm Place, will be pleased to hear of any likely competitors.

Birmingham Model Aero Club.

VERY good sport was obtained with the club's glider on Saturday week, although things ended in a glorious smash. There was a strongish wind during the afternoon, but some model flying was done before the glider was brought out, the best flights being 53 secs. by Mr. Trykle, 45 secs. by Mr. Mason, and 35 secs. by Mr. Hill. The glider emerged from its shed at 4 o'clock, and the first trial was started about half an hour later with Mr. G. Haddon Wood in the pilot's seat, when a hop of 20 yards between three and four feet above the ground was made. A further trial was made on the level with Mr. Cobham in charge, and it was then decided to try it down the hill with Mr. Oliver piloting. After four hops of about 40 ft. each at a maximum height of 7 ft., Mr. Oliver manipulated the elevator, the glider responding by rising to about 40 ft., lifting the two persons with the tow ropes at the end of each plane off their feet so that they had to let go. The machine then started to come down, but after dropping a few feet suddenly dived and then side-slipped, the left wing hitting the ground and doubling up. The pilot was buried beneath the *débris*, but after a few minutes' work he was extricated with nothing worse than a few scratches and bruises. It is probable the glider will be rebuilt.

Blackheath Aero Club (5, LIMESFORD ROAD, NUNHEAD, S.E.).

THE above club was recently formed with the object of drawing together practical model aeroplane constructors who reside in South London. Members entertained large and appreciative audiences on Blackheath during last week with some long and high flights. The crowds were greatly amused when members had to run a ¼ mile for their models, especially as the temperature was round about 85° in the shade.

The next meeting will be held on Blackheath to-day (Saturday), at 4 o'clock (weather permitting), members meeting near All Saints Church, which is in a conspicuous position on the Heath. Several members hope to give an exhibition of night flying with the aid of the small "sparklers," which are becoming increasingly popular with model flyers now the dark evenings are here.

Gentlemen who are specially interested in model construction and flying will be heartily welcomed, but the Committee wish it to be distinctly understood that those who join will be expected to *make* models—the object being to form a *body of workers*, not "*lookers on.*" Further information will be supplied on application to the Secretary.

Midland Aero Club (GRAND HOTEL, BIRMINGHAM).

ARRANGEMENTS have been made by which it is possible for a club member to hire a balloon carrying three passengers at the cost of twelve guineas. This price covers all expenses with the exception of the return fare of the passengers, and includes the assistance, as pilot, of Lieut. Lempriere. A 12 in. gas main has been installed at Dunstall Park and ascents will ordinarily be made from that place, but can be arranged from other centres if necessary.

Parkside Aero Club (2, EDBROOKE ROAD, PADDINGTON).

THE results of the Silver Cup Competition at Parkside on Saturday last were:—H. R. Weston, 1st, with W.H.C. monoplane; H. Hurlin, 2nd, with W.H.C. monoplane; Mr. Carter, 3rd, with Carter monoplane. Mr. Davies, of the Twining Aero Co., was kind enough to officiate as judge. The wind was very boisterous, but in spite of that Mr. Weston covered 220 yards, the model losing distance through circling in the air. Hurlin 128 yards, Carter 87, Woolley 58, Evans 46, Ingram 37. To-day (Saturday) there will be an open competition for silver cup and medals for models rising off ground and duration at Parkside.

St. Mary's Model Aero Club (PORTSMOUTH).

UNDER the above title a club has just been formed at Portsmouth in order to bring together those interested in the making and flying of model aeroplanes. The hon. secretary is Mr. H. W. A. Johnson, 32, Beecham Road, Kingston, Portsmouth, and he will be glad to receive catalogues of accessories, &c., for the use of members.

Scottish Ae.S. Model Aero Club.

A MODEL flying meeting will be held to-day (Saturday) at Ibrox, and a large gathering of members is requested. The ground is situated one minute's walk past Ibrox Station, between Paisley Road and the railway.

Several of the crack flyers of the club met at Ibrox on Wednesday evening of last week to have a preliminary trial. Many brilliant flights were witnessed, particularly by Mr. Mill's model, which seemed to have acquired a faculty for losing itself. A very interesting programme is being arranged for the autumn and winter months, and it is hoped to have a model flying meeting once every fortnight. The secretary will be very pleased to give particulars to anyone who would like to join the club.

Waterloo Model Aero Club (35 OXFORD ST. WATERLOO, LIVERP'L)

IN response to a proposal to start a model aero club in the neighbourhood of Waterloo, Liverpool, a number of prospective members came forward, but before the promoters felt justified in soliciting for members it was decided to hold a flying meeting on the Waterloo shore. This gathering took place last week and proved very successful, good flights being obtained with each of the ten models entered. The best performance was made by Mr. A. P. Hitchins, whose monoplane flew a distance of 1,140 ft. at a maximum height of 50 ft. Anyone who wishes to join the club may obtain full particulars from the hon. sec., Mr. L. T. Harvey, at the above address.

FROM THE BRITISH FLYING GROUNDS.

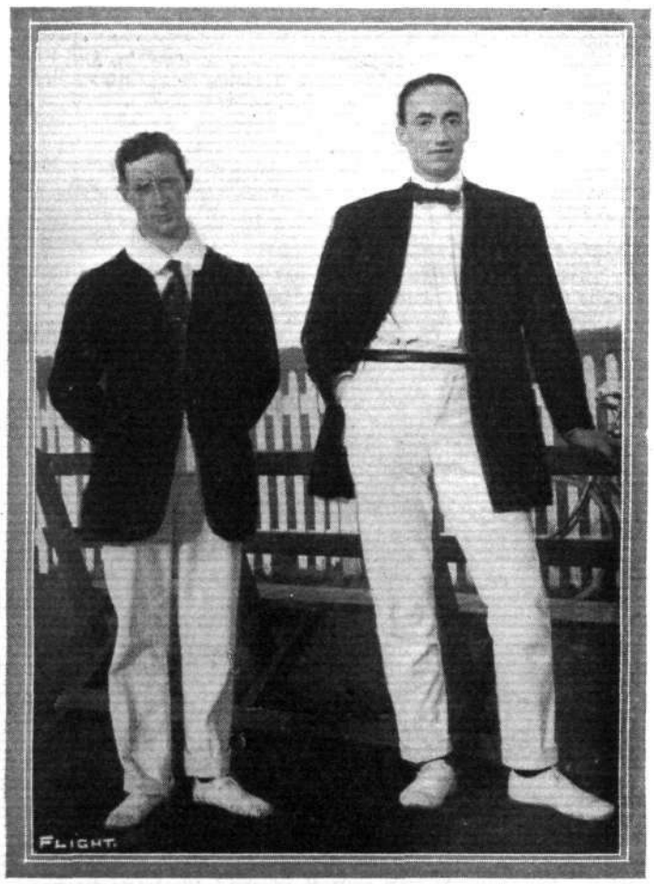
Brooklands Aerodrome.

WEDNESDAY last week was one of the best days for flying seen for a long time. Mr. Kemp was out airing the Flanders monoplane to some purpose, taking it along at a rattling pace 200 ft. up. The wings of this machine are strengthened with steel girders. Wednesday seems an unlucky day at Brooklands. Mr. Jack Humphreys' monoplane, which has been in preparation for months past, essayed its trial flight. It is of Blériot type, with a fine breadth of wing, well made, and fitted with a 60-h.p. Green engine, with which a pull of 450 lbs. is obtained. Starting her for a straight roll, the speed got up so rapidly that she lifted Mr. Humphreys unprepared, overwarped when only 10 ft. off the ground, thereby bringing the machine round and landing on the turn, twisting the undercarriage and generally breaking up the structure; fortunately Mr. Humphreys climbed out unhurt.

The ubiquitous "Henrietta" was never so hard worked as to-day. Mr. H. Petre took several spins at intervals, then handing her over to Lieut. Manisty, who, in practising for his certificate, made some pretty figures of eight, some wide, some sharp, finally landing safely. Some of the spectators evinced a little anxiety during the evolutions. The flight, which was somewhat of the character of handling a runaway horse, showed that the aviator has plenty of pluck, which in aviation is a very valuable asset.

The Avro-Farman was very busy all day, Messrs. Raynham, Noel and Young alternately piloting. About the same time Mr. Blondeau was up taking the evening air, and Mr. Spencer was busy with passengers.

Thursday was one of those unaccountable off days, made up for by an extra busy one next day, when the Flanders monoplane, after an excellent flight in Mr. Petre's hands, came to grief during a spiral *vol plané*. Landing on the turn, a wheel was buckled, letting the wing down and damaging a back stay, very little damage considering the speed, which speaks well for the strength of the under-carriage. Flying was suspended for a time by the wind and heat, until Mr. Cody brought out his "old" biplane, which has been resting here since the "circuit." After a trial spin, he was quite astonished at the difference between this and his new biplane, which has been doing 50 m.p.h.



Mr. C. P. Pizey and Mr. H. R. Fleming, who have been doing such splendid work at Salisbury Plain for the Bristol Co., and who are now flying at Brooklands in connection with the Bristol School there.

Nothing delights Cody more than to give an impromptu lecture to an interested crowd round his machine; his face lights up, and his eyes twinkle as he speaks, then with a glance at the flag over the sheds, he finishes up with "Well, the wind's about right now; I'll get along with the old 'bus to Farnborough. So long!" Somebody swings the huge propeller, and, flying low, just clearing the sheds, he disappears. Others making flights were Mr. Blondeau, followed by his pupil, Mr. Longstaffe; Mr. Spencer giving an exhibition flight; Messrs. Raynham and Noel on the much-improved Avro-Farman. Lieut. Porte had the new school Deperdussin out for engine test. A too-generous filling of the lubricating tank has its drawbacks, and in this case, the engine having been started, Mr. Gordon Bell, who was in the pilot's seat, was indulged in a copious spray bath of castor oil. Consolation was administered by Lieut. Porte, who assured Bell it was good stuff, and would make his hair grow. "Who will pay the ba-arber?" splutters Mr. Bell, as an extra dose in the mouth brought argument to an end. This machine is fitted with a 28-h.p. Anzani engine, and is of the same type as used by Mr. Ewen in his Firth of Forth trip.

Mr. Pixton, the shining light of Brooklands, has gone to the Salisbury school of the Bristol Co., exchanging places with Messrs. C. P. Pizey and H. R. Fleming, whose cross-country flights are legion, as record in FLIGHT bears witness. They have soon settled down to their new surroundings, and, after having seen several new machines from the Bristol Co.'s works put together, they essayed a trial flight on what will be the school machine. On the first trial it gave a real good account of itself, and will be fully up to Bristol standard when the controls have been regulated. Built on smart lines, this is one of the best machines now to be seen here.

It is gratifying to record that the attendance at Brooklands is improving, and some flying was seen both on Saturday and Sunday evenings.

On Saturday, Porte, on the Deperdussin, made some good circuits, flying very strongly and at a very good speed. Raynham and Hunter were out on the Avro-Farman. The latter is gaining confidence daily, and should get his ticket shortly. Young is also doing well, and has already made a right hand turn. Cadet Robinson, "the gift to the nation," was out on the Deperdussin doing very well, but unfortunately landed too late and ran into the ditch; not much damage was done though, and Gordon Bell was able to fly the machine back to the shed. Pashley was busy tuning up the Humber monoplane which he has acquired, and on Sunday Abbot, late of Hewlett and Blondeau, was doing some good flying during the evening. Pizey and Fleming were also flying on the Bristol in a gusty breeze, banking in very good style, and teaching pupils. Lieut. Esnie F. Chinnery had his first lesson on Tuesday at the Deperdussin school, and made splendid progress.

Filey School (Blackburn Aeroplane Co.)

MR. OXLEY, the instructor, has been doing good work on the school machine during the past week. Two new pupils have joined the school, Mr. R. J. Isaacson and Mr. Hugh R. Farren, both making short straight flights after a few hours' rolling. On Sunday Mr. Oxley took out the Blackburn "Mercury," which is fitted with an Isaacson engine, and considering that it was his first trial on a new machine put up a remarkably good performance and handled the machine in masterly style throughout. Monday was a busy day, Mr. Oxley taking advantage of the early ideal conditions, giving a fine exhibition of right and left turns, also many stunts and pretty evolutions; then climbing to 1,000 ft. he landed with a graceful *vol plané*, much to the delight of the spectators. After lunch he was out again flying at a good altitude, but was forced to land on account of the rainy and blustery weather.

Liverpool Aviation School, Sandheys Avenue, Waterloo.

BEFORE breakfast on Wednesday, last week, Mr. Jones was out on the school machine, and succeeded in making a fine figure 8 round marks 500 yards apart; unfortunately, owing to the breaking of a bolt, the propeller was badly damaged, which necessitated a rapid landing. In the evening he repeated the performance at a height of about 100 ft., terminating with a finely executed *vol plané*.

On Thursday no flying could be attempted owing to wind, but Mr. Hardman (a new pupil) put in some shed work by trying the engine and getting accustomed to the controls.

Mr. Hardman was out rolling for the first time on Saturday, and seemed to have full control of the machine on the ground. Later, Mr. Jones completed a figure 8, but discontinued owing to the puffiness of the wind.

In the afternoon, on Monday, Mr. Jones was out trying for his *brevet*, but the wind getting up immediately after he started, he only completed one turn and then finished off in a series of straight line flights.

London Aerodrome, Collindale Avenue, Hendon.

Valkyrie School.—At 5.30 a.m. on Tuesday last week Mr. Copland Perry was out with the school machine, making an exhibition flight of 30 minutes duration. He rose to 200 ft., and then proceeded to diminish the area of his circuits until the machine was banking in one corner of the aerodrome in quite expert style. Mr. Perry concluded the flight with two small figures of eight, landing with a perfect *vol plané*. Captain Loraine then mounted the machine and showed good progress.

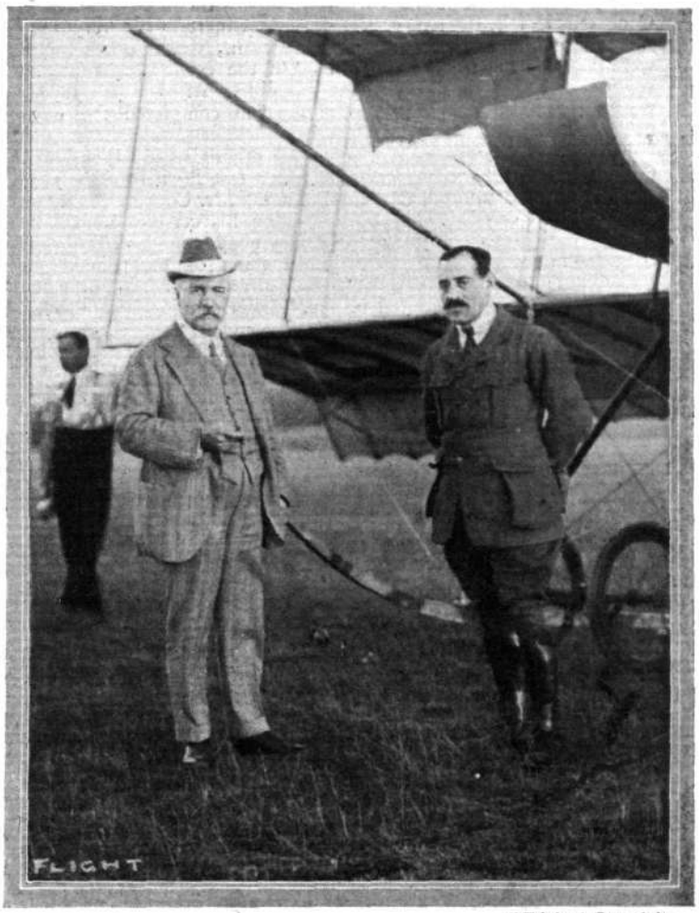
Mr. Copland Perry and Captain Loraine were out next day at 5.0 a.m., putting in good practice. At 7.30 a.m. Mr. Copland Perry ascended to pass the tests for his *brevet*. Quickly attaining an altitude of 300 ft. he completed his first flight in ten minutes at this height. His *vol plané* descent was faultless. The second flight was accomplished in equally short time. Owing to his anxiety to land within a few feet of the observers the descent was a trifle too sudden, and one small strut was damaged in consequence. Later, in order to satisfy the official observers, Mr. Perry made another circular flight, his descent this time being beyond reproach.

Fog was responsible for a late start on Thursday, and at 8.5 a.m. the school pilot took a turn in the air before handing the school machine over to Captain Loraine. The latter made rather an abrupt landing, and though the machine spun round almost in its own length, the Valkyrie under-carriage stood the strain well, and the machine will again be in commission in a day or so.

On Monday evening the weather conditions being ideal, Mr. Barber gave a fine demonstration, having just fitted a new Chauviere propeller. He attained an altitude of 1,000 ft. He then descended in order to take up some passengers, and finally gave a lesson to Capt. Loraine on the passenger carrier.

Mr. Barber, on Tuesday, at 6 p.m., mounted the racer, fitted with a new Gnome engine, and rapidly ascended to 800 ft. He landed with a fine spiral *vol plané*. Passenger flights were then given to Miss Barker and Miss Meeze, also to Capt. Loraine and Mr. Chambers for instructional purposes. Meanwhile Mr. Ridley-Prentice was busy on the school machine, successfully negotiating his first circuit on a Valkyrie. Capt. Loraine followed, and although it was only his third day on a machine, he accomplished two circuits of the aerodrome in excellent style, landing very steadily. Later Ridley-Prentice ascended once more, flying five or six circuits, and reaching an altitude well exceeding 150 ft. At this height he cut off, and landed *en vol plané*.

Lieut. Gregory, R.N., amuses himself during the hot and "remoute" part of the day with his fellow officers' pets at their temporary Eastchurch mess. On his shoulder is one of the twin kittens, named "No. 34" and "No. 38." The spaniel on his lap is the acquisition of Lieut. Gerrard, and "Jock" is Lieut. Longmore's "mascot."



"Flight" Copyright.

Sir George White (on the left), the founder of the British and Colonial Aeroplane Co., Ltd., and M. Jullerot, one of the many eminent pilots now associated with the Company.

Salisbury Plain.

The Air Battalion.—The military flyers having been away to Oxford, &c., there is little air work to record. On Thursday morning of last week Lieut. Barrington-Kennett arrived at half past eight flying at a height of about 1,500 feet. He made a very fine spiral *vol plané* and landed just outside his hangar, being none the worse for his long flight. In the evening Lieut. Conner arrived from Oxford and made a very pretty landing from a height of 1,200 feet. Since their return Capt. Fulton, Lieut. Barrington-Kennett, Lieut. Conner, and also Lieut. Reynolds, who is quite fit again after his recent accident, were busy at scouting practice round the Plains. On Sunday morning Lieut. Barrington-Kennett made a cross-country flight to Winchester, whence he was to have returned to Salisbury Plain again on Monday morning.

Bristol School.—During the earlier part of last week the weather was too bad for any continuous flying, and although Messrs. Gilmour and Jullerot ascended on Monday, the 28th ult., they had all their work cut out to fight against a gusty 30-mile an hour wind, which at times quite stopped their progress and provided them with some rather thrilling moments.

On Tuesday the weather improved a little, but Jullerot and Gilmour still found a nasty wind to fight, which, however, diminished towards evening, when tuition flights were resumed.

Wednesday morning was beautiful for air work, and Messrs. Harrison, Gibson and Cockerell carried out solo flights, executing some very neat figures of 8. Prier made his first solo flight on a biplane, and soon showed that he had the machine under a control as perfect as that which he has over the monoplane, and he took several pupils for instructional flights. Mr. Gibson took his *brevet*, observed by Capt. Kennedy, of the King's Royal Rifles, and Pizey. Mr. Gibson joined the Bristol school on August 7th. Mr. Cockerell rounded off a good day's flying by making a magnificent solo at sunset.

On Thursday morning Mr. Harrison secured his certificate, observed by Mr. FitzMorris, secretary of the British Embassy at Constantinople, and Jullerot. Mr. Harrison's tuition occupied a

little over three weeks, and he got through without a smash. Mr. Cockerell and Lieutenants Watts and Stuart were very busy doing solo figure eights and right-hand turns, whilst other pupils were taken for instructional flights. In the evening, a stiff wind springing up, not much flying was possible. After a little tuition work, Hotchkiss made a fine solo, which completed the day's flying.

Friday morning was rather foggy, but otherwise ideal, and Mr. Cockerell was able to perform his *brevet* test flights successfully, observed by Jullerot and Captain Pitcher. Mr. Cockerell had had only eighteen days' tuition before taking his certificate. In the evening conditions continued to be very good, and lasted so over Saturday morning. Lieut. Newall did his first solo flight, making a circuit which was really excellent, especially as he had had only one week's very much interrupted tuition. Lieut. Stuart was also up for two very good circuits, covered in fine style. Saturday evening was very windy and no pupils attempted solo flights, but a good deal of passenger carrying was done, Jullerot descending after night-fall and landing with the help of bonfires.

On Sunday evening Mr. Smith Barry and Naval Cadet Wheeler were sent for their first solos, and they flew several fine circuits finishing with good landings. Wheeler, after his first landing, switched his engine on again and started off for another flight, making a very sharp left hand circuit with good banking. It will be remembered that this pupil is a naval cadet aged 15 years who is spending his time, between leaving a Naval College and joining his ship, in learning to fly. Jullerot carried several passengers, making the last flight again at moonlight and finishing with a spiral *vol plané* just over the bonfire.

On Monday morning the weather was again good, and Lieut. Newall and Mr. Pitman, who each did solo circuits, showed signs of being almost ready for their *brevets*. Lieut. Watts made a solo flight round Fargo and Stonehenge, landing very well. He has made remarkably rapid progress and should qualify for his certificate as soon as opportunity presents itself. Altogether an excellent week's work has been done.

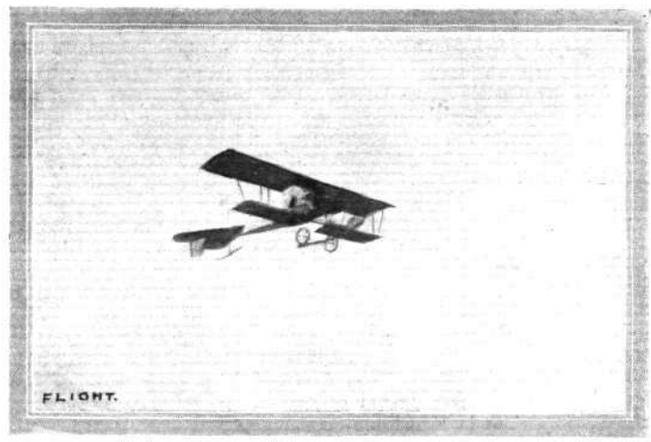


Photo by Mr. H. Bull.

Mr. J. Gaunt flying his small biplane over the Southport sands.

Southport Aerodrome.

ON the 30th and 31st ult. and 1st inst. Mr. Gaunt made flights over the foreshore in the direction of the pier, but was not able to attempt turns owing to the tricky wind. He made a trial flight on the "Baby" biplane on the 5th prior to the Hon. W. S. Leveson-Gower, R.N., taking charge. Mr. Leveson-Gower, after a few preliminary runs, made three short flights, landing perfectly each time, before darkness suspended operations.

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NEW WORLD'S RECORDS.

Fourny's New World's Duration-Distance Records.

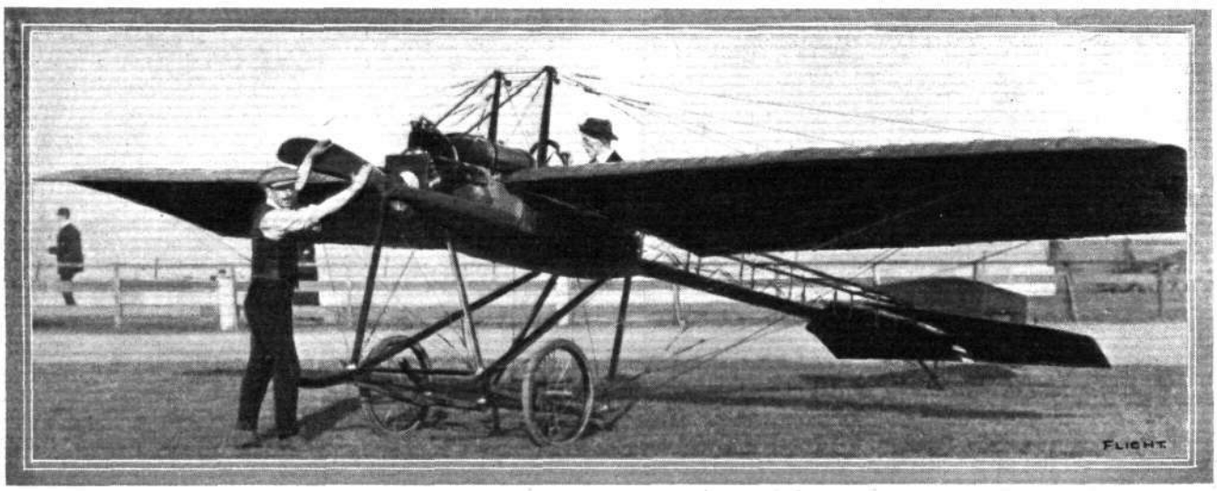
IT would appear that the present time is in many ways eminently suitable for record breaking, but as a feat of endurance Fourny's distance and duration record made on the 1st of the month will take a good deal of bettering. Having entered for the Deutsch prize for the longest flight in a closed circuit, he started off at 4.43 a.m., and circling continuously round a 10-kilom. circuit, at Buc, steadily piled up the kilometres until a quarter to four in the afternoon, when the motor apparently considered eleven hours' solid work sufficient for one day and jibbed, so that the aviator was compelled to come down. He had been in the air for eleven hours without a break and had covered 720 kiloms. By this flight he stands first in the Criterium d'Aviation of the Ae.C.F. He was flying a Maurice Farman biplane fitted with a Renault engine driving a Chauviere propeller. The previous duration record was Henry Farman's 8 hrs. 12 mins. made last December, while the distance record was to the credit of Olieslagers, 635·2 kiloms. on a Blériot monoplane, made at Kiewit on July 16th.

Garros Creates New Altitude Record—13,943 ft.!

STILL the competition for the altitude record goes merrily on. Lincoln Beachy's height of 11,578 ft. made at Chicago has now been put in the shade by the extraordinary performance of Garros, who on Monday, in the neighbourhood of St. Malo, went up on a Blériot monoplane to a height recorded by his barograph as 4,250 metres, or 13,943 ft., subject to official recognition. The previous French record, and a world's record previous to Beachy's flight, was the 2,350 metres reached on August 5th by Capt. Felix.

Sommer Carries Six Full-Weight Passengers.

THE question of weight lifting has a powerful fascination for M. Sommer, and on the 29th ult. he achieved a notable record by carrying six passengers, each weighing well over 10 stone, during a trip of 16 kiloms., from Douzy to Mouzon and back. On the previous evening he flew over on a monoplane to attend a banquet at Stenay, while his assistants, Visseaux and Bathiat, went over on a biplane.



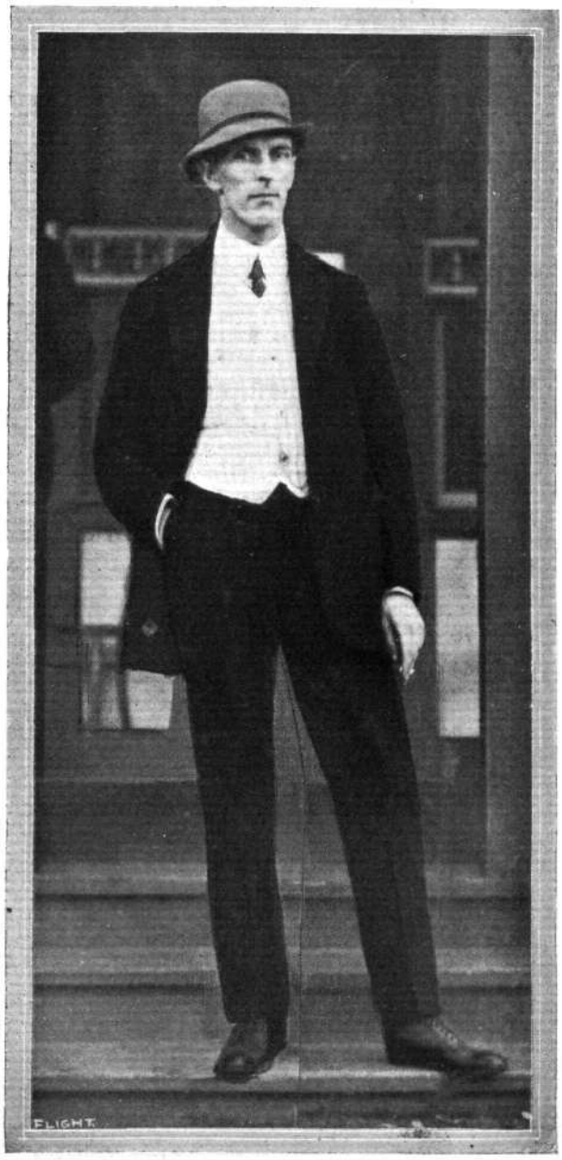
Mr. W. H. Ewen, who on Thursday last week flew across the Firth of Forth, from Portobello to Kinghorn and back again, on his Deperdussin monoplane, fitted with 3-cyl. Anzani engine. In our photograph, Mr. Ewen is seen in the pilot's seat ready for the starting of the propeller.

FLIGHT

FIRST ACROSS THE FIRTH OF FORTH.

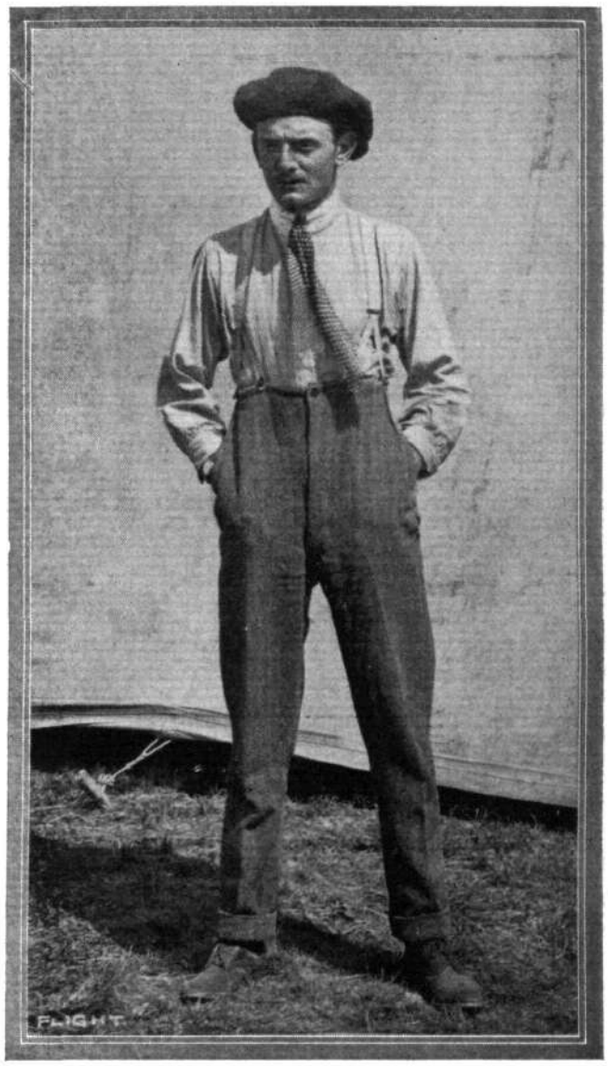
ALTHOUGH some time ago a prize was offered for a flight across the Firth of Forth, it was subsequently withdrawn, owing to lack of competition. On the 30th ult., however, the double journey across the Forth was made in splendid style by Mr. W. H. Ewen on his Deperdussin monoplane, one of the latest "popular" type. Starting from the Marine Gardens of Portobello, Mr. Ewen rose until he was about 1,000 ft. high, and passing Inch Keith went on until within a mile of Kinghorn. He then turned and proceeded up the Firth in the direction of Leith. Two miles from the port he once more turned, and this time headed for his starting point at Portobello. He was planing down there, but coming to the conclusion that the Sports Ground was rather too restricted for landing, he flew outside the ground, and descended in a field in the neighbourhood. As soon as the mechanics arrived the wings were taken off and the machine wheeled back to the aerodrome. Mr. Ewen was in the air for about ten minutes, and covered roughly twelve miles.

On his return to the Marine Gardens, Mr. Ewen was welcomed on behalf of the Executive by Councillor Rawson. Speaking of his flight, which he described as successful in every way, he said that he had a bad five minutes when at about the middle of the Firth on the return journey, when the machine rocked and swayed a good deal, but the Anzani-engined Deperdussin stood up to her work in fine style. He never had any difficulty in observing his location, and when over the water was easily able to make out the steamers beneath.



Mr. W. H. Ewen, the Scottish aviator who flew the Firth of Forth last week, as recorded above.

WESTON TO CARDIFF AND BACK.



Mr. B. C. Hucks, who, on a Blackburn machine, last week flew across the Bristol Channel and back, the first time this stretch of water has been doubled by an aeroplane.

DURING his visit to Weston-super-Mare Mr. C. B. Hucks decided to pay a visit by aeroplane to his one-time home at Cardiff. Everything was ready on the morning of the 1st inst., and when about 5 o'clock the Blackburn monoplane was wheeled out the wind was fairly calm. At ten minutes past five Mr. Hucks made an excellent ascent, but found the conditions altogether different immediately he began crossing the water. He was carried a considerable distance out of his course, but after getting clear of the Channel air-currents, was enabled to steer direct for Cardiff. He passed over Cathays Park at a height of 2,000 ft., and circling around the city, and over Gabalfa, Whitchurch and Llandaff, he steered in the direction of Marshfields, and then returned across the Channel to Weston, where he landed after a flight of 40 mins. While in the neighbourhood of Cardiff Mr. Hucks dropped messages addressed to the editors of local papers, as well as a number of handbills announcing his flights. His speed was very great on the way back, as he had the wind behind him, and his altitude during the demonstration varied between 1,500 and 2,250 ft. It was the first time the double journey across the Bristol Channel had been made in an aeroplane, and large crowds gathered both in Weston and Cardiff on hearing the peculiar hum made by the open exhaust of the Gnome engine. When he was over the Roath Dock all work was suspended while the return of the aviator across the Channel was watched. The demonstration was so successful that arrangements were at once made by Mr. C. E. Manton Day, Mr. Hucks' manager, for exhibition flights to be given on Wednesday, Thursday, and Friday of this week at Weston-super-Mare, similar exhibitions following at Cardiff.

AIR EDDIES.

THE need of some form of brake as a standard part of the equipment of the aeroplane was more than ever emphasised by the mishap that overtook Lieut. Cammell while landing at Hendon last Wednesday week. The following wind that had sprung up on the journey from Cambridge evidently upset his calculations somewhat, for although he commenced his *vol plané* quite early, and touched ground at least 200 yards from the sheds, the wind swept him forward, with the result that he charged the yielding doors of Hangar No. 1 at a speed of something like 30 miles an hour. Both his machine and the shed doors were naturally bent somewhat, but as his mount was of the engine-in-front type, he escaped with nothing worse than a fairly appreciable jolt. What would have happened had he been flying a machine of the everything-behind type is a contemplation that is by no means pleasant.

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Aviators in the past have been obliged to provide their own means of braking by jumping out of their seats and robbing the machine of its forward momentum by the vigorous application of their own feet as friction brakes. It is high time that manufacturers turned their attention to the fitting of a device that would eliminate the necessity of such practice, and ensure the machine being brought to a standstill as soon after landing as possible. A comparatively early but really very weak attempt at the solution of this difficulty was the abandonment of the tail wheel in favour of the tail skid. This, however, did not help matters forward a great deal, for in most cases the tail does not drop to the ground until the machine has covered something in excess of a hundred yards after it has actually come to earth.

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Prier, in the new Bristol monoplane, and Nieuport have made an attempt in this direction by the backward extension of the undercarriage skids in such a manner that they come into contact with the ground as soon as the tail drops in the slightest. Naturally, the drag caused by the ends of the skids accelerates the dropping of the tail, and actually does bring the machine to a standstill quickly. In Nieuport's case, if I remember rightly, this braking effect was one of the chief points in the patent specification of his landing-carriage. The transverse leaf-spring was intended to be sufficiently weak to enable the machine to land on the skid alone, while the wheels, in landing, were merely intended to keep the machine from rolling over on its side.

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Air-brakes seem to have proved a failure. I remember that a Mr. Garreau had one fitted to a monoplane with which he experimented at Park Royal some time ago. By pulling a lever by the side of the pilot's seat the rudder, which was composed of two planes arranged closely together, opened like a book, and presented a surface of about 6 sq. ft. No doubt his idea was quite an excellent one, and, moreover, really well carried out constructionally; but, at the same time, one could scarcely expect such a small surface to be of much avail in arresting the forward motion of a machine of such size and weight as the one to which he had fitted the device. Indeed, on one occasion when he found himself rolling straight for a ditch, and when a brake of some sort would have been of considerable value, he absolutely forgot its existence, so busy was he with his switch and throttle.

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It should not be long before at least one of the Valkyries that Mr. Barber presented to the Government is put into commission, for, calling at their sheds the other day, I found that the Gnome engine destined to drive it had arrived in all the glory of a peculiar wickerwork covering. When this engine is fitted it is highly probable that one of our Air Battalion officers will take the machine over to Farnborough by way of the air. Let us hope that the others will soon follow suit, for it is a pity to see such serviceable machines lying idle in their donor's sheds.

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Although the Naval officers flying at Eastchurch will think none the better of me for "splitting" on them, I cannot help remarking on the fine spirit they are displaying in their intention to advance the prestige of the British Navy in aviation matters. For the past six months they have been resigning themselves to an isolated existence in a small building not a hundred yards from the sheds in which their machines are housed. Thus they have been enabled to take every opportunity of flying. In reward for their perseverance, we find that two of them have world's and British records respectively to their credit. Even now one of their machines is waiting fully equipped for a promise of more favourable weather before making an onslaught on one of the most important of world's records.

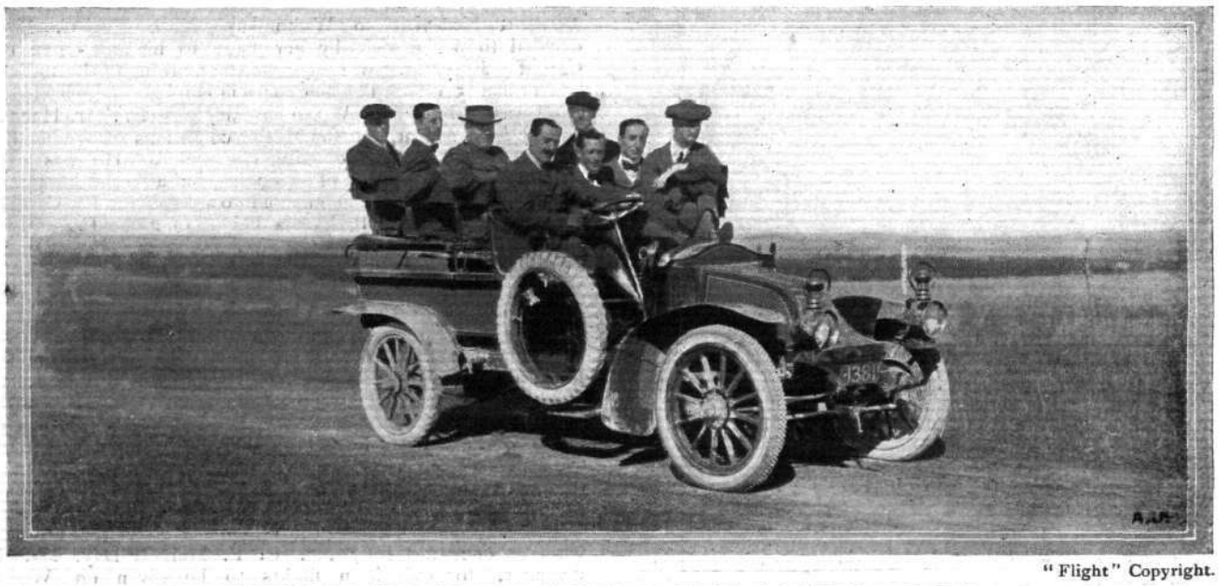
• • •

Aviation has suffered such a sequence of serious accidents just lately through the bursting of petrol tanks and consequent ignition of the spirit in the event of a rough landing that manufacturers must surely see the force of devising and fitting tanks that will eliminate the recurrence of such events. Only a few days ago we read of the death of a French officer from this cause, and even now, as I write, there lies before me an evening paper, proclaiming "Another airman burned to death." Most of these fatalities can be traced indirectly to a bad fall, occasioned by some structural rupture in the machine, or, possibly, loss of balance; but in nearly every case the chances are that the unfortunate pilots would still have been alive to-day had it not been for the fuel tank bursting and igniting.

• • •

Not long ago one of our contemporaries suggested the use of a leather covering for petrol tanks, as a preventative against further disaster. In any case, the fuel reservoirs should be most carefully insulated from risk of rupture and escape of contents. The use of solid petrol—a commodity that is still more or less in the experimental stage—would, if it were practicable, prove a remedy to the trouble.

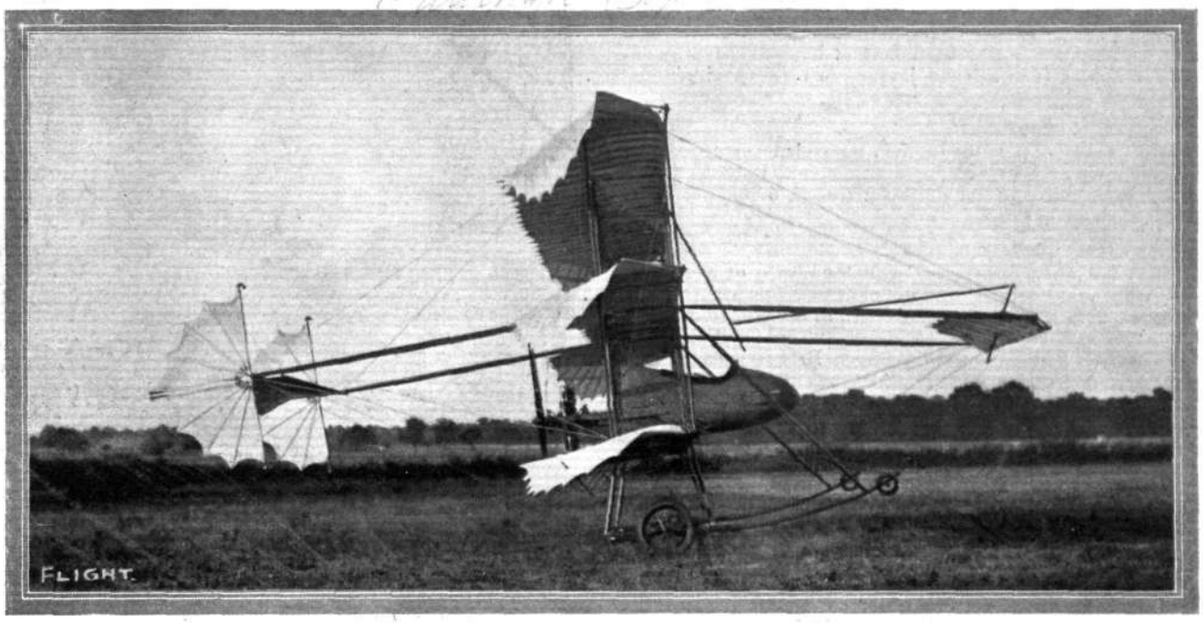
"OISEAU BLEU."



"Flight" Copyright.

ONE OF THE SALISBURY PLAIN BRISTOL "'BUSES" WELL LOADED.—M. Jullerot is at the wheel, and at the right are Messrs. Pizey, Fleming, and in the Mordkinesque pose, Mr. Graham Gilmour.

FOREIGN AVIATION NEWS.



THE LATEST PRODUCTION OF M. PAULHAN.—Side view of the triplane which was last week tested in the air.

The Astra Triplane at Issy.

BOTH the new biplane and the triplane produced by the Astra Works have been tested nearly every day during the past week at Issy. Only straight flights have been made with the triplane, but the double-decker was taken round the ground several times on Monday by Goffin, who is conducting the tests.

The Hanriot Family Flying.

FIRST carrying his sister, Lili, for a trip over Betheny on Saturday afternoon, Marcel Hanriot then took his sister, Germaine, over Witry-les-Rheims, and in a third essay was accompanied by his mother round the clock tower at Burgoyne. Afterwards, he was giving lessons to several of the pupils at the Hanriot School.

An Accident at Issy.

WHILE landing at Issy, after making a trial flight on the 1st inst., the aviator, Convert, in avoiding some soldiers at drill, failed to notice three workmen. Two of them got clear by laying themselves on the ground, but one of them was struck by the propeller. Fortunately, the results were not very serious, the man escaping with cuts and bruises on his arm.

Distinguished Visitors at Buc.

AMONG the visitors at Buc on Sunday last was a party from the British Embassy, and the daughter of Sir Francis Bertie, the British Ambassador, was taken for a flight by Mr. Maurice Farman, as also was Mr. George Grahame, one of the secretaries at the Embassy.

Entries for L.N.A. Motor Trial.

AT the time of closing at ordinary fees the number of entries for the motor contest, organised by the Ligue Nationale Aerienne, was fifteen. In Class I, for motors under 35-h.p., there were three—Hebe, Nieuport, and Anzani. In Class II, for motors between 35 and 70-h.p., there were eight—Clerget, Anzani, 50-h.p. Gnome, 60-h.p. Gnome, Aviatic, Lemasson, Picker, and Verdet; and in Class III, for motors above 70-h.p., there were four—Labor, Canton Unne, Gnome, and Aviatic.

More Breguets for French Army.

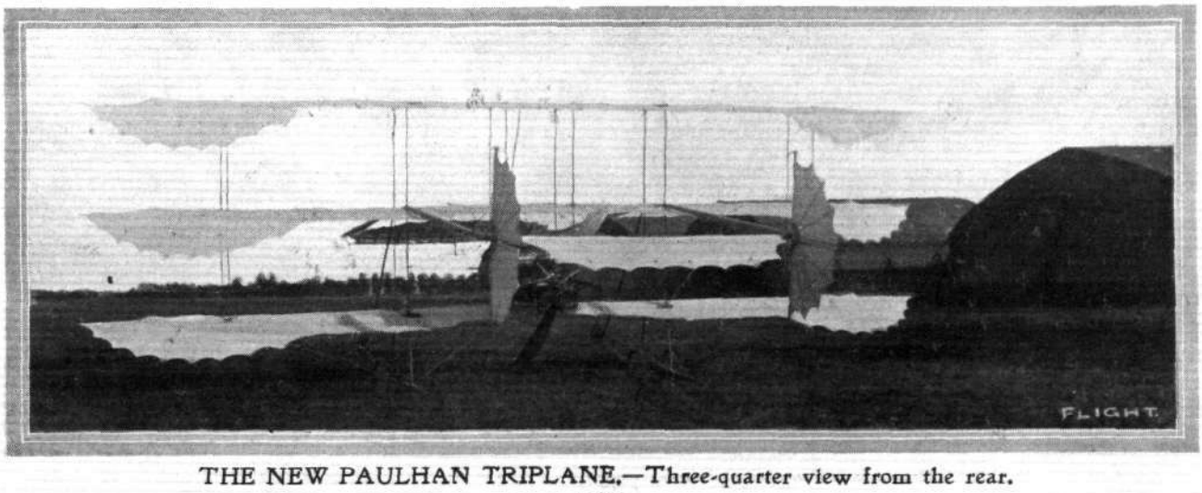
FIVE new three-seated Breguet biplanes were tested by Moineau at Douai on the 29th ult. and were taken over by Lieuts. Ludmann, Peralda, Gourlez and Migaud, who are using the machines in the manœuvres now in progress. With a load of 300 kilogs. a speed of 90 k.p.h. was attained. On the 31st ult. Lieut. Migaud, accompanied by a sapper, flew over to Vesoul on one of the machines.

An Aviator in Lake Constance.

WHILE flying over Lake Constance the Swiss aviator, Siedler, fell from a height of 30 metres. He "landed" about 200 metres from the shore, but had equipped himself with a life-saving belt, and so was able to keep afloat until rescued by a boat.

An Antoinette Given to French Army.

ON the 31st ult. Lieut. Rochette, at Mourmelon, took over an Antoinette monoplane which has been presented to the French Army



THE NEW PAULHAN TRIPLANE.—Three-quarter view from the rear.

by M. Hennessy. By way of testing it, he was flying for over two hours at a good height. This performance he repeated on Sunday last.

Bille Delivers a Henry Farman Biplane.

ALTHOUGH the weather was none too propitious, Bille, the chief pilot at the Henry Farman School, decided to deliver by way of the air a biplane which had been built at Bouy to the order of a gentleman at Toul. He made the journey in 1 hr. 17 mins., the speed being in the neighbourhood of 100 k.p.h.

Testing an R.E.P. Monoplane.

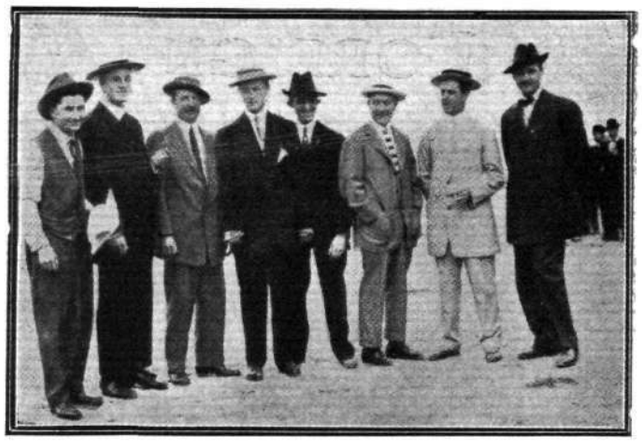
BY way of testing one of the R.E.P. monoplanes intended for use in connection with the French Army manœuvres, Bobba, on the 29th ult., at Buc, rose to a height of 400 metres in 6 minutes, and was flying for a couple of hours.

A Disastrous Week-End.

SATURDAY last was a disastrous day in the history of aviation, the French Army being robbed of two of its best flyers, while a third fatality occurred in France, and a fourth in the United States. The two officers were Capt. Camine and Lieut. de Grailly, who, with Capt. Chaunac, had set out from Buc on R.E.P. monoplanes with the intention of flying to Vesoul, which was to be their head-quarters during the Army Manœuvres. They reached Nangis safely, by which time Lieut. de Grailly was about a mile ahead of his companion. It was while passing over Vanville, some six miles further on, that those who were watching the two officers saw Capt. Camine's monoplane suddenly dip, and, when about 50 metres from the ground, capsize and drop like a stone. On the spectators reaching the scene it was found that Capt. Camine must have been killed on the spot, a broken petrol pipe having severely injured his head. Ignorant of the fate of his companion, Lieut. de Grailly went on intending to land at Troyes. About half-an-hour after the accident to Capt. Camine he was over Mont-de-Rigny, close by Nogent-sur-Seine, when apparently the officer came down by a circular *vol plané*. The few who saw him land thought everything was all right, but in a few minutes the machine burst into flames. It was found impossible to do anything to rescue the pilot, who apparently was unable to get clear of his seat before being overcome by the flames, and so was burnt to death.

The third fatal accident in France occurred to M. Maron, one of the instructors at the Savary School. On Saturday evening about 7 o'clock he started off from Chartres in the direction of Artenay and was in the neighbourhood of Berches-les-Perres when the machine appeared to capsize and drop to earth. It is uncertain how the unfortunate pilot met his death, as immediately following the mishap the wreckage took fire, the aviator's body being badly burned.

The last accident occurred in America and is a further instance of the irresponsible mob leading to a fatality. Mr. J. J. Frisbie, who had been giving exhibitions on a Curtiss aeroplane at Norton, in Kansas, on Friday evening, damaged his machine, and in view of the boisterous wind on Saturday he decided not to make any attempt to fly. A big and noisy crowd had assembled, and on hearing the aviator's decision became very angry. Owing to their taunting shouts of "coward," Mr. Frisbie decided to risk a flight. He had risen to a height of about 100 feet and was flying well when in making a turn a gust of wind caught it and caused it to capsize, the unfortunate aviator being killed instantly by the fall.



AT CHICAGO AVIATION MEETING.—A group of aviators who were at the event. From left to right—Horace Wild, Lee Hammond, John J. Frisbie (the victim of popular clamour), Rene Simon, Chas. K. Hamilton, William R. Badger (since killed), J. C. Mars, and René Barrier.

Hélen Visits M. Deutsch de la Meurthe.

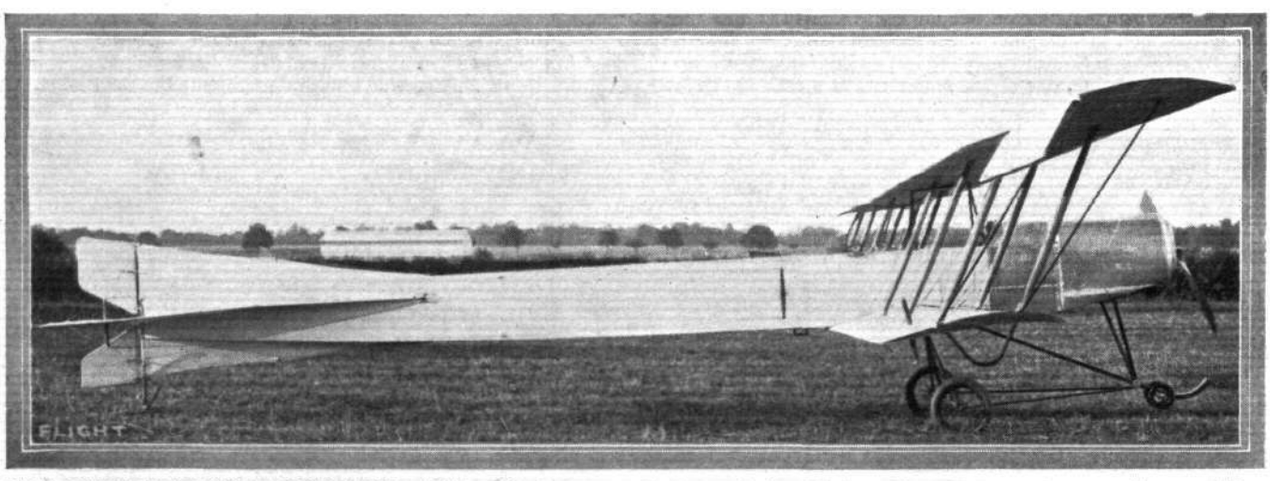
LEAVING Issy on the morning of the 29th ult., Hélen, who at present stands first for the Coupe Michelin, flew over to Vernon, where, after circling round the church tower, he made tracks for the grounds of M. Deutsch de la Meurthe. Descending he was cordially greeted by that excellent sportsman and a number of his friends. After partaking of a little refreshment he started off on his return to Villacoublay, after having first stowed away on his Nieuport machine a magnificent hare presented by his host. This little circular trip counted for the Quentin Bauchart prize, for which Hélen is engaged in a keen struggle with Vedrines.

A Novel Gift for Hélen.

BY way of marking their appreciation of the splendid flight of Hélen for the Michelin Cup, and in recognition of the fact that he was the first to cover more than a thousand kilometres in a day, MM. Seguin Frères, the makers of the Gnome, have presented Hélen with one of their 50-h.p. engines. In the course of six days the Gnome motor fitted to his Michelin Cup Nieuport machine covered over 2,000 kiloms. without giving any special trouble.

Duval Tries for the Coupe Michelin.

FLYING over a course of 100 kiloms. in the neighbourhood of Crotoy, Duval, on a Caudron biplane, after covering over 800 kiloms. on the 31st ult., was obliged to come down and abandon his attempt, which he hopes, however, to renew at an early date.



THE NEW "ZODIAC" BIPLANE.—This, the latest production of the Zodiac Society, was last week tested in the air by M. J. Labouchere at St. Cyr. In general appearance the machine reminds one of the features of the Breguet and Goupy machines, the former by the narrowness of the main planes, the boat-shaped body, and the tractor in front, and the latter by the staggered arrangements of the main planes. The question of rapid dismantling for transport along the road has also been given special attention by the designers.

Vedrines and the Quentin Bauchart Prize.

ANOTHER 150 kiloms. was added by Vedrines to his record for the Quentin Bauchart prize on the 31st ult., when, starting from Issy, he went to Gidy and then to Lumery, from which point he continued on to Etampes on the following morning. Starting off again, he landed at Marmougnes, close to Gidy, and later flew back to Issy.

Other Competitors for the Quentin Bauchart Prize.

ALTHOUGH Vedrines has already a good record to his credit in the cross-country competition for the 50,000 franc Quentin Bauchart prize which closes on the last day of this month, several others are making determined efforts to catch him up. Renaux, on a Maurice Farman biplane, has been making several cross-country flights from Buc to Vincennes, Chartres, &c., and Tabuteau on his Morane also intends to try for the prize, as also does Duval, while Hélen already has a good record.

Flying to the Manœuvres.

DURING the past week or so Vesoul, which has been fixed upon as the headquarters of the French military aviators during the manœuvres now in progress, has been the objective for many of the officers from all parts of France, and among others Lieut. Ludmann, Migaud, Beralda, and Gourlez flew over from Douai, making a stop *en route* at Chalons. Lieuts. Malherbe, Blard, Duconneau, and Captain de Goys flew from Chalons, Captain Felix from Etampes, and Captain Casse from Toul.

Aeroplanes as Eyes for Artillery.

IN the presence of a large number of officers of the French Army an extended series of tests were made at Verdun on the 30th ult., to demonstrate the assistance which could be rendered by aeroplane pilots to artillery officers defending a besieged spot. Three biplanes, piloted respectively by Capt. Casse, Lieut. Blard and Lieut. Menard, and a monoplane piloted by Capt. Bellenger, the first three each accompanied by an officer, were sent up to locate the attacking force, and it was claimed that as the result of the reports furnished the gunners were able to train their guns so that the enemy would have been completely wiped out.

Aeroplanes at German Review.

WHILE the German Emperor was conducting his Annual Review of the Guards at Templehof on the 1st inst., two aeroplanes, piloted respectively by Volmuller and Eyring, appeared over the ground and carried out some evolutions, the first-mentioned pilot from aloft obtaining some photographs of the scene.

Flying Over the Cattegat.

A NOTEWORTHY flight over Danish land and sea was accomplished on Saturday morning by the German aviator Robert Thelen on a Wright machine. Leaving Aarhus he steered for the island of Samso, and crossing it flew on to Thornved, between Kalundborg and Holbak, where he had to come down for petrol and oil. He decided to wait for some time owing to a strong wind, and later in the day ascended again and landed safely at Copenhagen. His net flying time for the distance of 172 kiloms. was 2 hrs. 36 mins.

To Cross the American Continent.

ALTHOUGH the £10,000 prize offered by Mr. William Hearst for a flight across the American continent has not produced an overwhelming number of entries, it is announced that Mr. Robert Fowler will start from the Pacific side to-morrow (Sunday) on a Wright biplane. At the time of going to press it was not settled whether the start should take place from Los Angeles or San Francisco, but the destination is New York. Mr. Fowler will be followed by a special train, and by flying on an average about 123 miles a day, the aviator reckons to cover the 3,200 miles in 26 days, four days less than the maximum specified by the rules.

Guns for Aeronautic Work.

THE artillery department of the U.S. Army have been paying a good deal of attention to guns for aeronautic work, and a six-pounder and a one-pounder gun have been produced and tested, although, of course, authentic details as to results are not forthcoming. The six-pounder is said to have a maximum range of seven miles, and is capable of elevation to any degree, while the one-pounder has a range of 18,000 ft., although it is said the tests show that it is difficult to get an accurate range after 10,000 ft. The sighting apparatus is, however, to be redesigned and improved.

THE ADAMS-FARWELL ROTARY MOTOR.

THE accompanying description and illustration relates to a five-cylinder aeroplane engine, introduced by the Adams-Farwell Co., of Dubuque, Iowa, U.S.A., who claim to be the originators of the rotary motor. As far back as 1898 they built a rotary engine, and since 1903 have been building them for the Adams-Farwell cars. It is only just lately, however, that they turned their attention to the aviation motor.

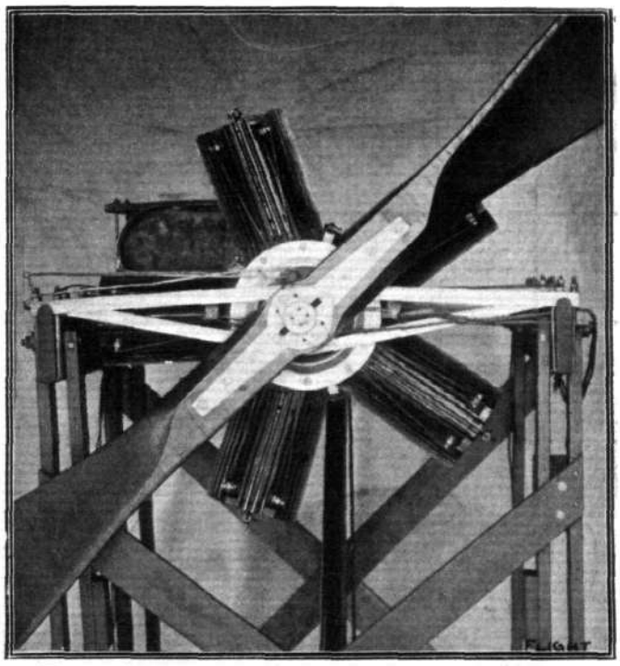
The Adams-Farwell aviation motor is similar in many respects to the motors used in the car. It has five cylinders, having a bore and stroke of six inches, and is rated at 72-h.p. by the A.L.A.M. formula (bore^2 × No. of cylinders ÷ 2·5), which is the same as the R.A.C. The principal features of this motor may be summed up as follows :—Single-throw crank, combined inlet and exhaust valves, positive fuel and oil feed, and longitudinal radiating fins. Most interesting of the above, is undoubtedly the elimination of the carburettor, though this is by no means original, as it has been adopted by others, notably on the early Antoinette. The fuel is sprayed into the cylinders, where it is mixed with a charge of air drawn in on the suction stroke through the single valve. As there is only one valve in each cylinder head, the former can be made sufficiently large to ensure a full charge of air and an unobstructed exhaust. In order to relieve the cam controlling the action of the five valves from the heavy load of opening against the high pressure during exhaust, the cylinders are provided with auxiliary exhaust ports, which are uncovered by the piston on its downward stroke.

The motor is controlled entirely by regulating the amount of fuel injected, and the only adjustment that might be construed as belonging to the carburation system is the valve by which this control is accomplished ; the speed of the motor can be regulated through a wide range by this simple means.

The lubrication system, which has been patented by Mr. F. O. Farwell, is operated by a multiple pump, somewhat similar to the magazine of a revolver. Each longitudinal chamber carries a plunger which, as the chamber revolves, is driven from end to end by two stationary cams, causing a small amount of oil to be drawn into each of the chambers at the bottom and ejected into a corresponding tube at the top. This oiler supplies cylinder oil of an extra heavy grade to the cylinders and the various bearings.

Two independent systems of ignition are employed and two spark-plugs are fitted to each cylinder, either or both of which may be used. Longitudinal cooling ribs have been adopted, resulting from a series of experiments carried out some years back, when it was found that they were far more efficient than the circular type.

Any grade of petrol or naphtha can be used, but when the lower grades are employed it is desirable to have a small tank of high-grade petrol to facilitate starting. When tested one of these motors, with a 9 ft. 6 in. propeller of 6 ft. pitch and running at about 1,000 r.p.m., gave a thrust of 440 to 460 lbs.



View of the Adams-Farwell rotary aviation motor.

CORRESPONDENCE.

*** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

Correspondents communicating with regard to letters which they have read in FLIGHT, would much facilitate ready reference by quoting the number of each such letter.

Bird Flight.

[1339] I am very pleased to find that by your leading articles in FLIGHT you are encouraging the study of natural flight.

I find it difficult to persuade inventors of to-day and makers of aeroplanes the necessity of so manufacturing their aeroplanes that they (the aeroplanes) play, in and *on* the *air*, a more *active* and less passive part than they now do in flight; that is to say, *after* the engine and propeller have raised the machine and given it the necessary momentum for the start on a journey. For it is *then* that the force of gravity exercised upon a properly *formed*, flexible aeroplane, made of suitable materials, should automatically do a very great deal towards helping in its turn the overtaxed engine, and towards forward and upward progress in or rather *on* the air, creating its own resistance to and by the air below and around it. And relieve the engine of a good deal of its excessive work and wear and tear, and also diminishing the necessity for travelling at so great a pace to maintain its buoyancy. And again, in the event of the engine failing at a great height, the pilot of the machine should be able, with such a properly constructed aeroplane, with its outspreading "primaries," so to speak, to lay hold of the air, in the way it is shown throughout natural flight, and in a man swimming. And above all, giving the pilot every opportunity and chance of descending gradually, gracefully, and safely to earth.

Cambridge. EDWARD P. FROST.

Engine Mishaps in Flight.

[1340] Whilst making a circuit at Brooklands on the 19th ult., at the height of about 60 ft., a loud report rang out, the machine, a Farman type biplane, shivered several times, and as the engine stopped I was forced to make a somewhat hurried landing.

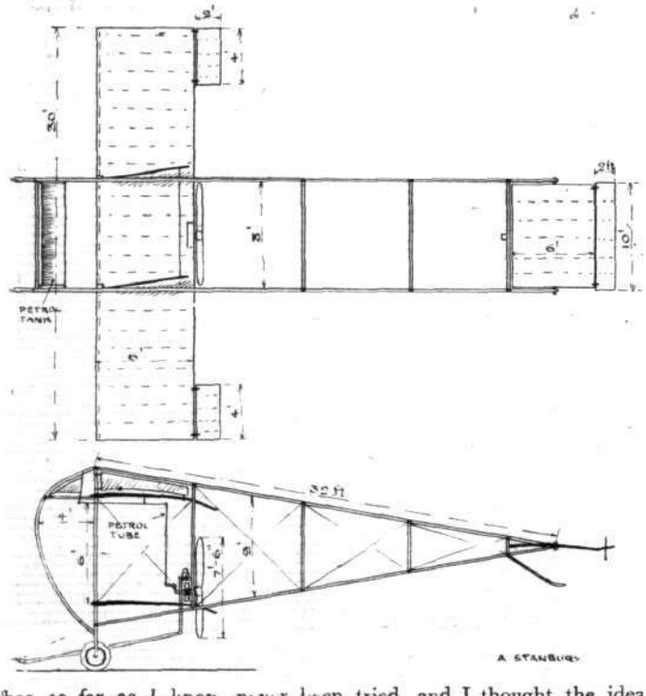
On looking at the Gnome engine I discovered that one cylinder had been blown completely off on account of the base stripping at the crank-case, and that two more were damaged. The propeller also was badly chipped.

I am very anxious to find out how often this has happened before, and what damage it has caused on such occasions. I understand that Lieut. Cammell had a somewhat similar experience with an engine of the same make.

Brooklands. J. L. LONGSTAFFE.

Rudders Above Main Planes.

[1341] I submit a sketch showing a biplane with a pair of rudders mounted above the upper main plane. This arrangement



has, so far as I know, never been tried, and I thought the idea might be worth while putting on record.

Liverpool. A. STANBURY.

Aeroplanes in War.

[1342] There seem to have been one or two slight misprints in my letter No. 1284. In the second column of p. 687, *after a time* a should read *after a time* $t\frac{vh}{4a}$, which occurs twice afterwards, ought to be $\frac{\sqrt{h}}{4t}$, or more correctly $\frac{\sqrt{h}}{4{\cdot}01t}$.

With reference to letter 1274, R.A.'s remarks on the telegraph are very true, but might I be permitted to refer R.A. to F.S.R., Part I, Section 9 (1): *When reports are sent by signal, they will be confirmed in writing on the first opportunity.* Again, in the same section: *Important communications should be sent by more than one means.*

R.A.'s pile of accusations on the subject of bomb-dropping chiefly resolves itself into the fact that in my calculations I neglected the resistance of the air both to the horizontal and vertical motions of the projectile. This I did, as I could not see then, and cannot see now, how any aviator could possibly include these in his calculations while in the air. Mr. D.H.T. seemed to think that aviators would have hard enough work in merely adjusting the apparatus and using a slide rule. It is obvious that the resistance would alter the trajectory of the projectile somewhat, yet at the same time we must not forget that the aerial gunner has a larger target to aim at than his earthly brother, and so there is more room for error.

As to the matter of setting the plane of the instrument in line with the resultant course of wind and motion, a weathercock might be employed, though care would have to be taken in placing this in a position where it is immune from the draught of the propeller.

Might I venture to inquire of R.A. what height above a dirigible, in attacking it from an aeroplane, he proposes to attain in order to be out of danger of the burning hydrogen; how he proposes to determine this height, and the relative speed of the dirigible and aeroplane; how he will make certain of hitting the envelope, and, what is more important, what precautions he intends to take that the corrosive acids do not burn holes in the tail of his own machine, that the spanner should not foul his own propeller, or that the ignited petrol should not set light to his own planes. In that R.A. considers 2,000 ft. an insufficient height for a machine to be safe from rifle fire, the writer begs to disagree with the gallant officer. In the first place it is by no means easy to estimate rapidly and with accuracy the height of an aeroplane; secondly, an aeroplane is a very small target, even at 2,000 ft.; and, lastly, this being by far the most important difficulty, what seems from land to be two or three lengths in front of the aeroplane may in reality be anything from 10 yards to 100. Besides this there is the minor difficulty of the sights used on land being useless.

Finally, I am happy in agreeing with R.A. in his opinion respecting the dropping of weights from dirigibles, although, with him, I fear that I cannot see that the case of the "Patrie" is a case in point.

Knocke, Belgium. O. D. ATKINSON.

Oblique Propellers.

[1343] In all modern aeroplanes the axis of the propeller is horizontal. Apparently this is the most efficient arrangement, but the following will show that it is not:—

Given that propeller thrust = T, angle of descent of machine when gliding = θ, and that lift from planes = horizontal thrust $\div$ tan θ.

To calculate the lift when the propeller axis is horizontal, lift = $\frac{T}{\tan\theta}$.

To calculate the lift when the propeller axis has an upward inclination of θ:—

Horizontal component = T cos θ.

$\therefore$ Lift from planes = $\frac{T\cos\theta}{\tan\theta} = \frac{T\cos^2\theta}{\sin\theta}$.

Lift from propeller alone = T sin θ.

$\therefore$ Total lift = $\frac{T\cos^2\theta}{\sin\theta} + T\sin\theta = T\left(\frac{\cos^2\theta+\sin^2\theta}{\sin\theta}\right) = \frac{T}{\sin\theta}$,

which is considerably greater than $\frac{T}{\tan\theta}$ for fairly large values of θ.

The difference in lift may only be slight, but there is no reason whatever why the propeller axis should be horizontal when the more efficient oblique position incurs no inconvenience.

If my reasoning is incorrect I hope you will point out the error.

Sparkbrook, Birmingham. J. W. W. WILLSTROP.

FLIGHT

OUR READERS ASK:

IS there any reason why a small Wimshurst machine could not be used for ignition in place of a magneto on petrol engines? [1344]

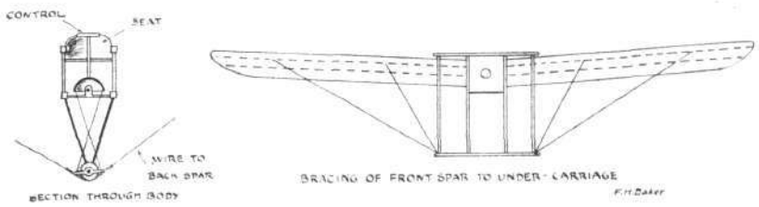
We know of no instance in which a Wimshurst machine has been used for this purpose, but we are acquainted with one engineer who has considered the problem at any rate worthy of thought. It appears to us that there is no *primâ facie* evidence of advantage to be gained by substituting a Wimshurst machine for a magneto, because it would be necessary to use a condenser and a mechanical distributor, which would probably make the complete plant more bulky, if not heavier, than a magneto. Also the interference of damp on a machine of this type would be a very serious consideration.—ED.

IF the extensions to the upper plane of a Farman military type biplane were hinged to the central portion, would the act of pulling one of them downwards raise that side of the machine? [1345]

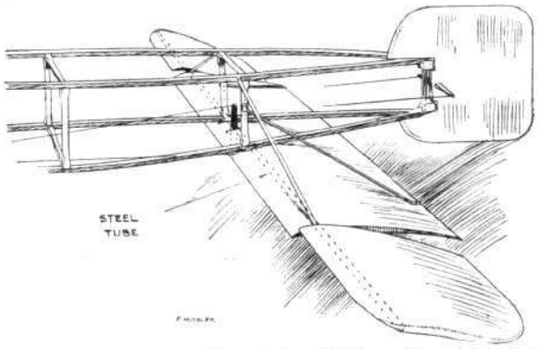
Inasmuch as the act would be equivalent to flapping it would momentarily tend to increase the local distribution of pressure, but so soon as the extension plane has reached the limit of its downstroke its projected area would be diminished and its contribution to the support of the machine in flight correspondingly reduced, so that its permanent effect would be to disturb the equilibrium in the opposite sense.—ED.

WILL you give particulars of the bracing and warping of the Blériot wings and the details of the Cross-Channel type tail? [1346]

The front spar of the wings is rigidly fixed to the frame in sockets and is trussed as shown on the right of the accompanying



sketches; the rear spars are hinged to the frame and are warped by the cross wire control as shown on the left. In another sketch we



show the movable extremities of the Blériot tail, which form the elevating planes of the Cross-Channel type machine.

IF the weight of the Gnome rotary engine could be reduced by one-half, would the flywheel effect of the lighter cylinders be adequate for the proper operation of the engine? [1347]

There is really only one answer to this question, and that is to wait until the Gnome engine *is* reduced by one-half of its present lightness. The need for a flywheel diminishes as the number of cylinders increases, and as the turning moment of the Gnome engine must be exceptionally even it is probable that the flywheel effect absolutely necessary only attains to a very small value.—ED.

HOW are the centres of pressure and gravity determined in a full-sized aeroplane? [1348]

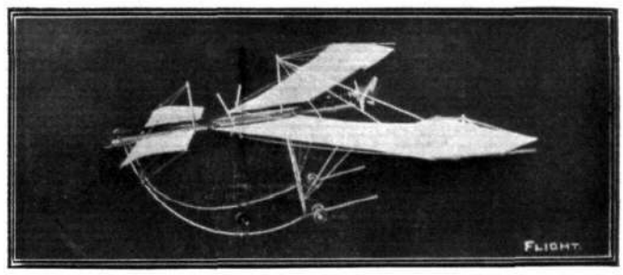
Assuming that the aeroplane has a main plane and a tail the designer estimates the total lift exerted by the main plane and the total lift exerted by the tail, from which by the elementary principle of moments (see "Flight Manual," F. 18), he can calculate the spot about which the two pressures will be in balance by virtue of the difference of the leverages at which they act. This is the centre of pressure of the machine and it must be made to coincide with the centre of gravity, which is ascertained in much the same way. In calculating the position of the centre of gravity all the principal masses are carefully weighed and their positions plotted so that the centre of gravity of the entire system can be calculated by taking moments about a fixed point.—ED.

MODELS.

Model Construction.

[1349] In my model aeroplane by means of the V-shaped wings fitted to the rear-part of the machine the tail forms part of its main planes, since the rear ends lie behind the centre of gravity.

Here the steering-planes are fixed, which serve, when worked in



the same direction, as elevator, and when worked in a different direction, as balancers and at the same time as rudder.

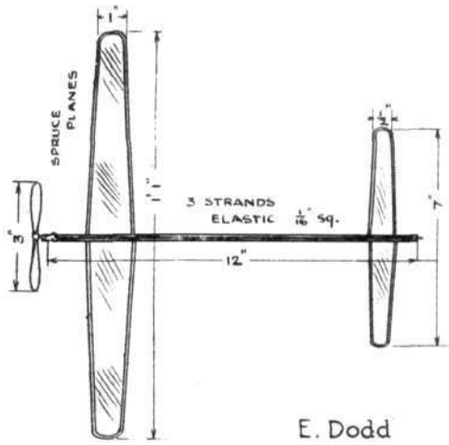
For the manipulation of this steering apparatus the levers to be found to the right and left of the pilot's seat are employed.

The front plane is adjustable and serves for longitudinal stability.

Experiments with a model propelled by an elastic motor have been attended by excellent results.

Berlin. A. GLADE.

[1350] The sketch that I send herewith of an elastic-driven

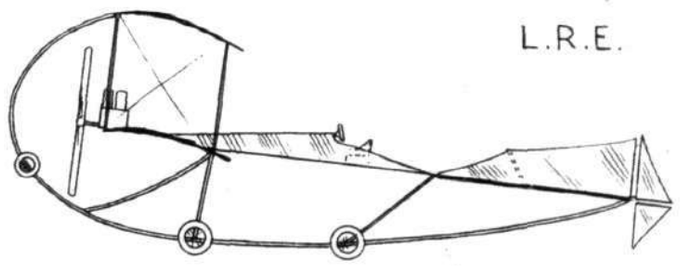


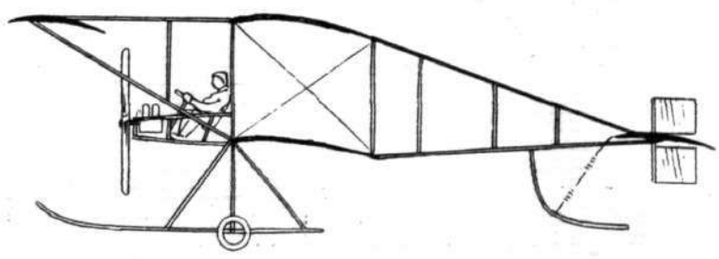
model illustrates a particularly speedy little machine that may be of interest to your readers. It is very simple and very neat.

Wednesfield. E. DODD.

[1351] I enclose two sketches that may interest some of your readers as comparative designs for the fitting of protective skids to the landing carriages of aeroplanes, particularly models.

L. R. E.

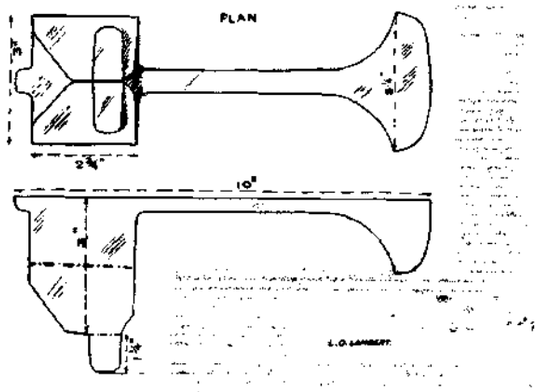




Paper Model.

[1352] I have read with interest the numerous letters in your instructive paper relating to paper gliders.

Enclosed I send the drawings of one of my successful and easily made types. All required is a sheet of foolscap or drawing paper,



double in halves and cut as in lower sketch, then open out and fold the planes as shown in plan, and the glider is completed. The dihedral angle of the tail should be less than the main planes; no weight is required.

If launched from the height of 6 ft. this model will easily glide from 25 ft. to 30 ft.

Cambridge. L. D. LAMBERT.

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AIRSHIP NEWS.

"Beta" Out for a Trial.

ABOUT 6 a.m. on the 1st inst., the Army dirigible "Beta" was taken out of its shed at Aldershot, and, with Captain Broke-Smith in charge, sailed to Farnham, and after circling over the town, returned to Aldershot with a strong following wind.

Italian Airships Cruise in Company.

THE two military dirigibles, P2 and P3, left Casale on the 2nd inst., and cruised in close company to Milan, the journey taking an hour and three quarters, during which it was stated the two vessels were never more than about 100 metres from each other.

Mishap to German Dirigible.

While the German military dirigible M1 was being prepared for a voyage from Berlin to Thorn, it was caught by the wind, and the *nacelle* bumped so badly that the trip had to be abandoned. It had previously made some satisfactory trials, and had come down for the oil and fuel tanks to be filled up.

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Anzani Engines and the British Empire.

AN important announcement is made in regard to the sole agency for the British Empire for the well-known Anzani engine. This has been secured by the General Aviation Contract Co., of 30, Regent Street, S.W., and they are now in a position to supply latest types. It was a 28-h.p. engine of this make which was fitted to the Deperdussin machine on which Mr. W. H. Ewen recently made a double flight across the Firth of Forth.

The Art of Aviation.

IT is sufficient testimony to the fact that Mr. R. W. A. Brewer's book on aviation fills a niche in the Library of Aeronautical Knowledge that a second edition was called for within eight months of the book originally appearing. The great strides which were made during the time the first edition was on sale led to a good deal of revision being necessary, and Mr. Brewer has been careful to bring up to date both the text and the illustrations. Outwardly the book remains unaltered and should still be valuable for imparting a good general knowledge as to present day aeroplanes and engines, while gliding receives a considerable amount of attention. The publishers and price are Crosby, Lockwood and Co., 7, Stationers' Hall Court, 10*s.* 6*d.* net.

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PUBLICATION RECEIVED.

The Encyclopædia of Sport and Games.—Edited by the Earl of Suffolk and Berkshire. Vol. III; Hunting, Racing. London: William Heinemann. Price 10*s.* 6*d.* net.

SCHOOL AERO CLUB NOTES.

ONE of my correspondents, Mr. Wilfred Bothwell, of Holywell Green, near Halifax, has sent me an extremely interesting paper glider which he has designed and constructed. Altitude is normally obtained by shooting the machine from a kind of catapult, the motive power of which is supplied by a thick band of ¼-in. strip rubber. The glide is of a remarkably steady nature, and the duration and distance far surpass those of any other paper model that has come under my observation. Mr. Bothwell informs me that on one occasion he obtained a flight of 360 ft., and I myself have secured results not very inferior to this. Both indoors and out the paper glider always affords a means of studying the more elementary facts of aviation, supplying at the same time the fascination, if not the physical exertion, of model aeroplane flying. My readers will be interested to hear that the Federation hopes to organise another model glider competition in the near future.

I wish to suggest to those of our members who are away on holiday—as indeed I shall be myself ere these lines are printed—that they have an ideal opportunity to indulge in model glider and model aeroplane flying. At many of our seaside resorts the sands at low tide afford the best of flying grounds, spacious in extent, and, above all, free from trees. The existence of the latter in the great majority of our English fields makes the life of the model aeroplane flyer an absolute misery, unless indeed he happens to be a Boy Scout, and, consequently, an experienced climber. Even if the beach should not be of sufficient extent, there are in the vicinity of most seaside towns spacious commons and waste lands which can easily be utilised as aerodromes at little or no inconvenience to the general public. In reference to beach flying, the sand must be occasionally washed out of the rubber motor with fresh water, but that is the sole disability. "Flight golf" can be indulged in, and fine "cross-Channel" flights performed across creeks and inlets. Even if the model should share the fate of Latham's historical Antoinette, its recovery should not be totally lacking in interest. And, above all, I hope our members will bear in mind the fact that the more they fly their models in public the more will their elders become interested in aviation.

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Aeronautical Patents Published.

Applied for in 1910.

Published September 7th, 1911.

19,261. J. A. BLONDIN. Flying machines.
19,700. W. J. H. BEACH. Aeroplane.
27,087. L. WITTGENSTEIN. Propellers for aerial machines.

Applied for in 1911.

Published September 7th, 1911.

2,215. W. THEINERT. Aeroplanes.
4,734. O. HEIMSTADT. Aerial propellers.
5,018. V. P. FLEISS. Aeroplanes.
11,535. E. H. ANDRAE. Stabilizers.
15,910. L. BLÉRIOT. Aeroplanes.

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